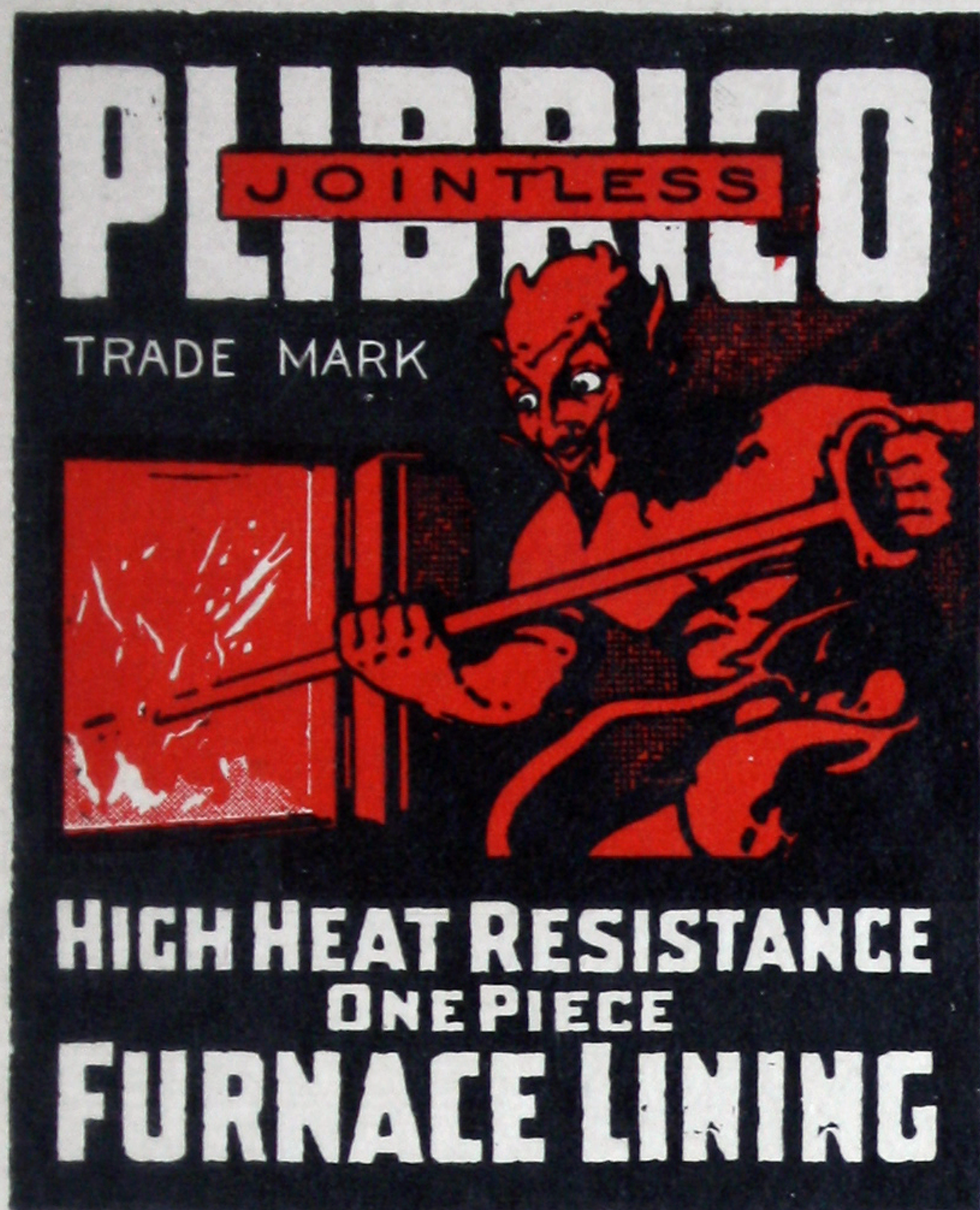


13-13.

MAY 12 1919



Jointless Fire Brick

(Commonly Called Devil's Putty)

Copyright 1919
by
Jointless Fire Brick Co.
Chicago, Illinois

General Information for Installing Plibrico Jointless Fire Brick

***WE EMPHASIZE** the importance of carefully following these directions, for if this is done the resulting Jointless one-piece lining will be far superior to a lining constructed of laid-up fire brick. The fact that PLIBRICO is so easy to install, tends to carelessness in not following directions closely.*

See that the material is in the proper condition for installing.

Dry and bake out as per instructions.

JOINTLESS FIRE BRICK CO.

Kingsbury and Clay Streets

CHICAGO, ILL.

PLIBRICO has been but recently developed and is a great improvement on any material of its kind.

It has been on the market in its present perfected state for something over a year and a half and has given wonderful results.

The Jointless Fire Brick Co. is applying for patents to protect its formulas and methods of manufacturing its product, and also the various appliances and methods of installing it. A license to use the appliances and methods of installation goes with the sale of PLIBRICO.

Introductory

THE wonderful results accomplished by the fuel administration during the war has brought the power plant owner to a realization of the criminal waste of fuel in the majority of plants. The information gathered in its questionnaires has opened the eyes of the country generally to the enormity of fuel waste and has done more for fuel conservation and efficiency in the short space of about a year than all the power and heat specialists have accomplished in the past fifteen years.

It has demonstrated what can be done in the way of fuel economy and efficiency. Clothed with the power of the government, it has by its moral influence alone brought about a remarkable change in conditions.

Its work should be perpetuated. The statistics and material gathered by the administration should be turned over to some permanent branch of our government and continued. The country has not yet fully realized the savings made possible by way of heat conservation.

The boiler room may be considered as a manufacturing laboratory. We have the boiler which generates the power primarily by means of a chemical reaction known as combustion— CO_2 is liberated in this reaction which as you know is scientifically measured in determining the efficiency of the conversion of fuel into British Thermal Units.

There are instruments for measuring the draft, analysing the gases, testing the coal, the feed water, temperatures, and pyrometers and instruments that indicate heat and fuel economy. There are mechanical stokers, all kinds of grates; heaters, feed pumps, apparatuses and devices too numerous to mention.

It is a matter of insulating pipes, removing soot from boilers and purifying feed waters, and last but not least comes the human equation of operating with the aid of such instruments and devices. And here is where many

a concern will hire a cheap man to run an expensive and intricate equipment at a fancied and imaginary saving.

Every power plant must be considered by itself as conditions vary extremely. Just how far to go in the way of fuel saving devices and instruments for testing and regulating fuel consumption in order to get the best economy out of the plant can only be estimated and planned by experts, and we will leave this for such experts to determine.

It goes without saying that in combustion, the proper supply of air to the fuel is a matter of primary importance. The boiler setting and furnace building must be looked after to get an economical consumption of fuel. Mechanical control of air and every scientific device and instrument is of no avail if the furnace is not properly constructed with a lining that will not leak air and gas.

This from observation and experience has been shown to be a tremendous loss and we have the satisfaction of contributing in our product one of the most satisfactory and one of the largest factors in fuel economy that can be installed in any power plant.

Given a boiler in good condition with a properly constructed setting and Plibrico Jointless Fire Brick Lining under ordinary care in operation and you have the foundation and beginning of an economical equipment. Other really economical requirements might vary considerably but as to the efficiency of an **air tight refractory one piece furnace lining** under a boiler there can be no doubt, whatever the plant or boiler may be.

The saving in fuel alone will pay for a good experienced engineer and a considerable dividend besides. It is not only the saving of fuel but the satisfaction and results to be had from a good equipment.

Of what avail are all the instruments and devices and ultimate steam indicators and economizers if the very fountain head is full of leaky joints and cracks and the very setting ready to fall to pieces?

DEVIL'S PUTTY

A Jointless Fire Brick Lining is a sure and determinable saving of one of the largest preventable losses of economy in a boiler plant. There is neither guess work nor hit or miss in this element of economy and no one of experience or knowledge on the subject will contradict this statement.

No one is more capable of judging the requirements of your equipment than your engineer. If he is a competent man leave it to him; if he is not competent, we think there is no better investment than to get one that is.

Every **real** fuel saving device is an **investment**, not an expense, and it takes proper care and supervision to get all there is out of a pound of coal.

The result will astonish you.

The Jointless Fire Brick Co. desires to extend its congratulations to Mr. Jos. W. Hays who is the author of a wonderful book on "How to Build Up Furnace Efficiency," written in non-technical language, that can be understood by any one who seeks more light on fuel conservation. It believes every plant operator and engineer who reads it will appreciate the human side of the writer's point of view, as well as the thoroughness with which the subject of fuel economy is set forth.

Through the courtesy of Mr. Frank A. Chambers, Secretary of the Smoke Prevention Association it is permitted to reprint pages taken from the proceedings of the 12th annual convention of the Smoke Prevention Association which will be of interest to all engineers who are vitally interested in the problems of combustion and economical boiler settings, and take a real interest in increasing the efficiency of their plants.

The craft is indebted to Mr. Chambers for his hearty co-operation in the cause of fuel economy and combustion engineering to which this country has committed itself in the last year and the undersigned wishes to add its endeavors in giving the subject matter all possible publicity.

JOINTLESS FIRE BRICK CO.

Plibrico Jointless Fire Brick Is Used In All Places Where Ordinary Fire Brick Is Used

Plibrico Jointless Fire Brick is an unbaked high grade fire brick. It is plastic and is shaped and pounded into place like moulded clay, the furnace lining being thus made first and afterwards baked out and vitrified and the result is a **One Piece Jointless Furnace Lining**; better than any fire brick; guaranteed to stand 3100 degrees Fahrenheit, that will not leak air or gas and will not crack or spall. Made for Hard Service and for any kind of boiler settings or furnace linings.

Do not apply it as a plaster over ordinary fire brick. It should never be used **less than 4½ inches thick**. Before installing see that the material is in proper condition as indicated on page 8.

Preparation for Installing Important

See that the man-holes are tight and that no water reaches the material after it is installed and being burned out, nor is it advisable to get the lining wet even after it is vitrified. Water will ruin any kind of a lining at any time.

Tear out the old fire brick lining which you intend to replace, also the "headers" in the common brick (usually found in every fifth or seventh course to tie the fire brick) and pound PLIBRICO into these bond holes or pockets.

Mix some PLIBRICO with water to the consistency of a thin grout and with an old broom brush the surface of the common brick to insure a bond between the common brick and PLIBRICO lining.

DEVIL'S PUTTY

Now build your lining by taking one chunk at a time, and pound it in well to get a solid compact lining not less than $4\frac{1}{2}$ inches thick.

This may best be done with a large wooden carpenter's mallet covered with cloth or gunnysack to keep the material from sticking to it and with a twisting rather than a direct blow.

The harder it is pounded, the more solid and compact, the better will be the result.

The lining should in all cases be not less than $4\frac{1}{2}$ inches thick **without any thin places or tapering edges.**

Pound it thoroughly.

Drying Out

After the PLIBRICO has been pounded into place and your lining is completed immediately start a slow wood fire or banked coal fire. Where forms are used do not have the fire hot enough to burn out the wooden forms until the material has had a chance to bake out sufficiently to stand up without the support. Do not allow the material to air dry after it has been installed. The quicker a slow fire is started the better. Air drying forms a crust on the surface and when the fire is applied, the heat cannot penetrate through the crust as when the material is first applied.

Beware of quick drying. Too much heat at first forms a steam of the moisture, causing the material to separate from the wall and crack. Dry out slowly as above from six to eight hours or longer if possible.

Then Bake

After the moisture has been removed by a slow fire for **six to eight** hours **gradually increase** the heat up to **24 hours**, and bake the material into a solid one-piece Jointless Lining until vitrified.

For Temporary Repairs

To repair burned out, cracked or broken parts in any fire brick lining, cut out the defective part at least four

inches deep, entirely undercutting the old lining in order that PLIBRICO may be keyed into place. Clean the parts that require patching; brush the old work with a thin solution of PLIBRICO to bind old and new, then tamp in the PLIBRICO, smooth the surface, dry and burn out.

Emergency Repairs

For quick repairs, without drawing the fire, make balls of PLIBRICO, place on end of the slice bar and ram in sufficient PLIBRICO until the place is filled. The furnace will run for weeks until a convenient opportunity comes for repairs. A barrel of PLIBRICO is simply an insurance premium against total break down of boiler plant.

Proper Condition

PLIBRICO should be in a **stiff plastic condition** not too wet but moist enough to make it bond together properly. It should be just wet enough so that you can take a chunk of it and place it on another and pound them together into one solid mass. If the material is too wet it will crack, and if too dry to bond together when being installed, it will not vitrify properly.

In Case of Dryness

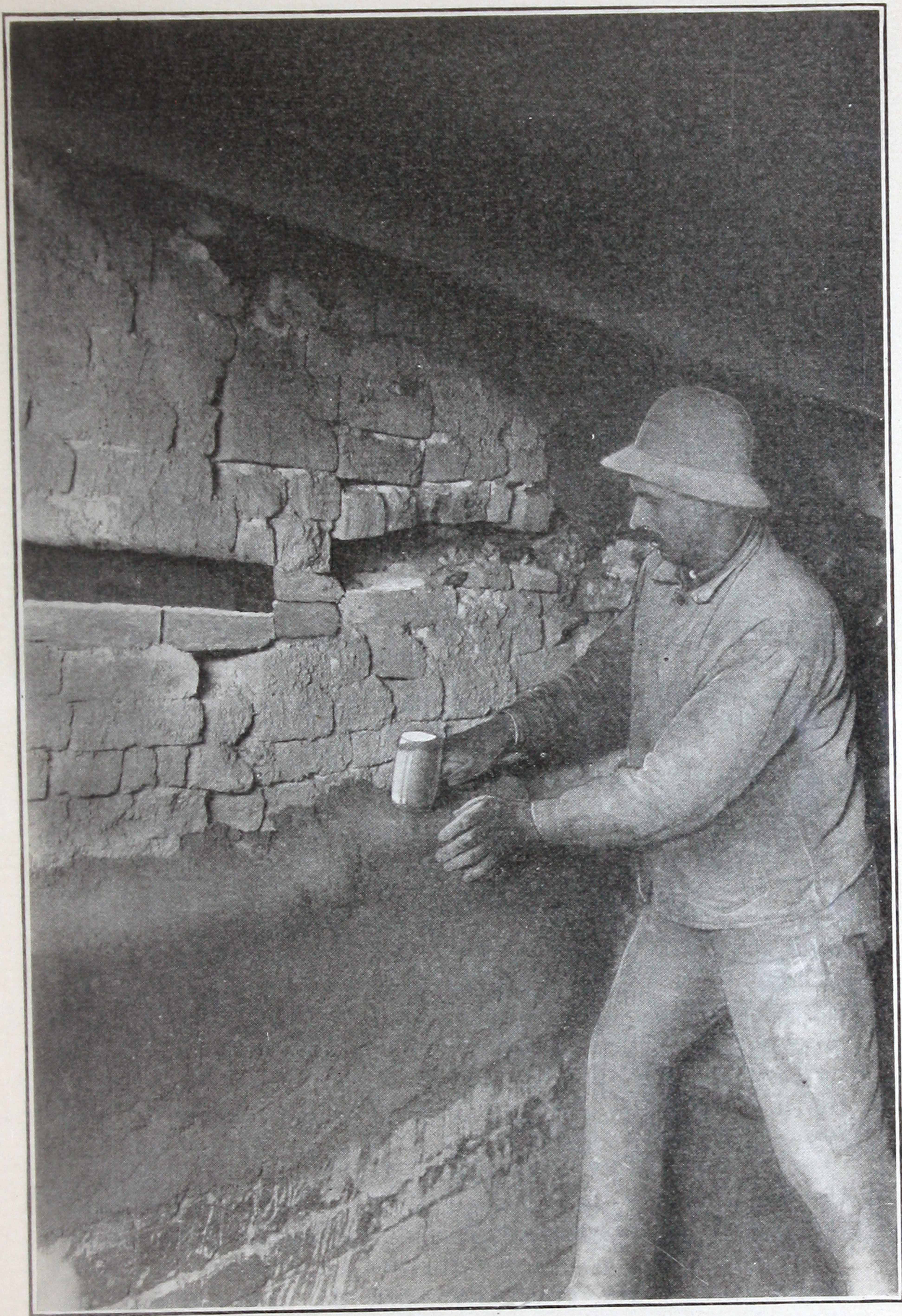
If the material is too dry place in a mortar box and pound thoroughly until all the lumps are broken, add enough water to bring it back to its original **stiff plastic condition**. Add water gradually and pound and mix it thoroughly until material becomes plastic. **Do not use material in a slushy or watery condition.**

After bringing material back to a plastic condition, let it stand for 24 hours before using if possible to allow the moisture to become completely absorbed.

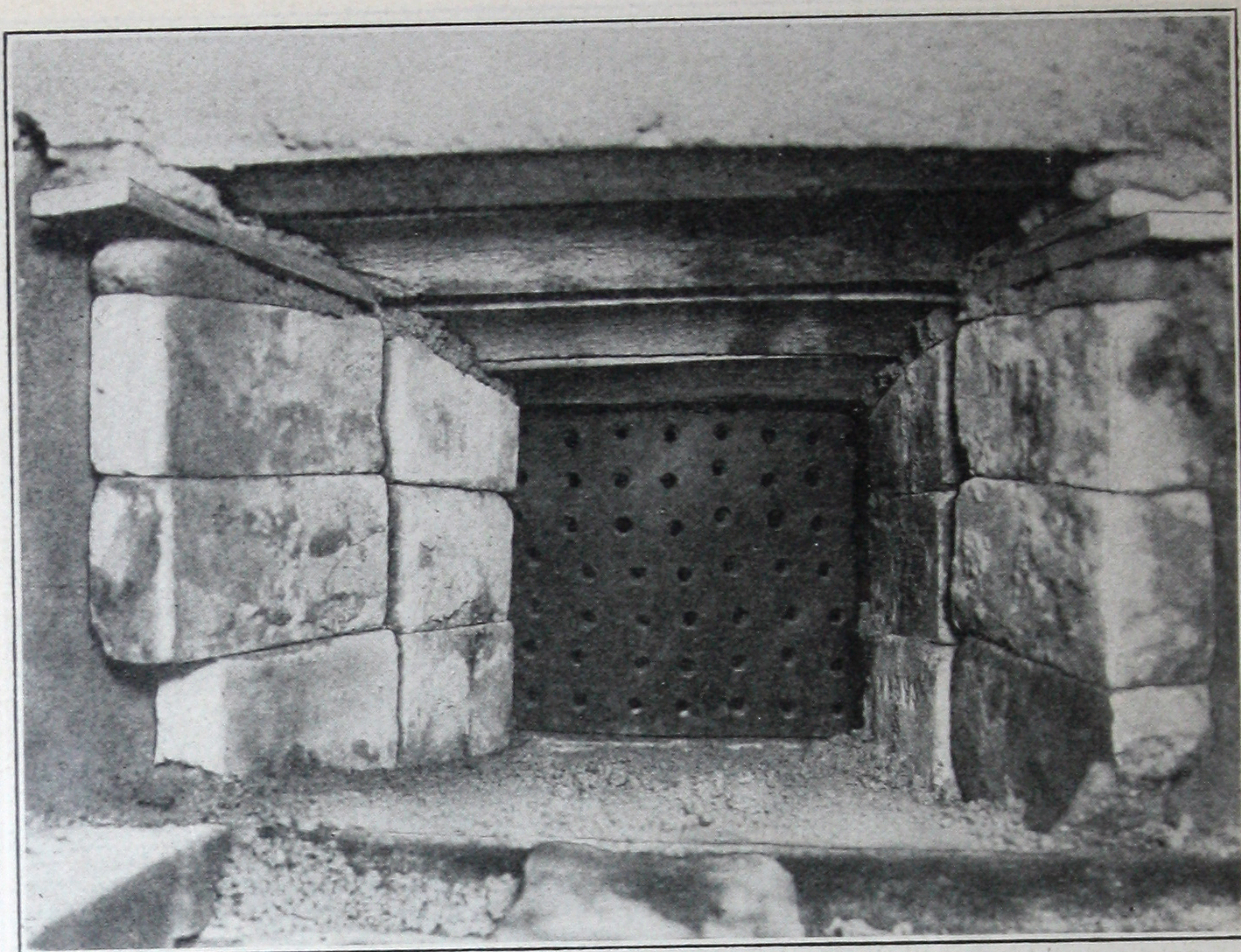
In Case of Freezing

Allow material to thaw out thoroughly before installing. Upon first thawing out, the material will be found excessively wet, this being due to the fact that

DEVIL'S PUTTY



Side wall with one layer of surface bricks removed, showing PLIBRICO Jointless Fire Brick being pounded into place in chunks to make wall $4\frac{1}{2}$ inches thick. Note how headers have been pulled out to bind PLIBRICO to outer wall.



Our method of building the arch on ordinary barrel staves, temporarily supported by old fire bricks on side. When thoroughly vitrified the side supports are removed leaving front door arch as shown on page 14 (lower cut)

Front Door Arches

The above cut shows a square door arch.

To install PLIBRICO (where there are no cast iron door liners) use old brick on the sides to support the centering for the arch as shown, after the cheeks or jambs have been put in, and use either straight boards or barrel staves to support the arch and pound the material on top of same.

For a curved front door arch use the bricks as above, and use barrel staves or a piece of sheet iron sprung into place, to give the arch the proper radius, pounding the material in as before.

If there is only one large door arch, it can be done the same way. In all cases leave the forms in until they burn out or the arch is completely vitrified.

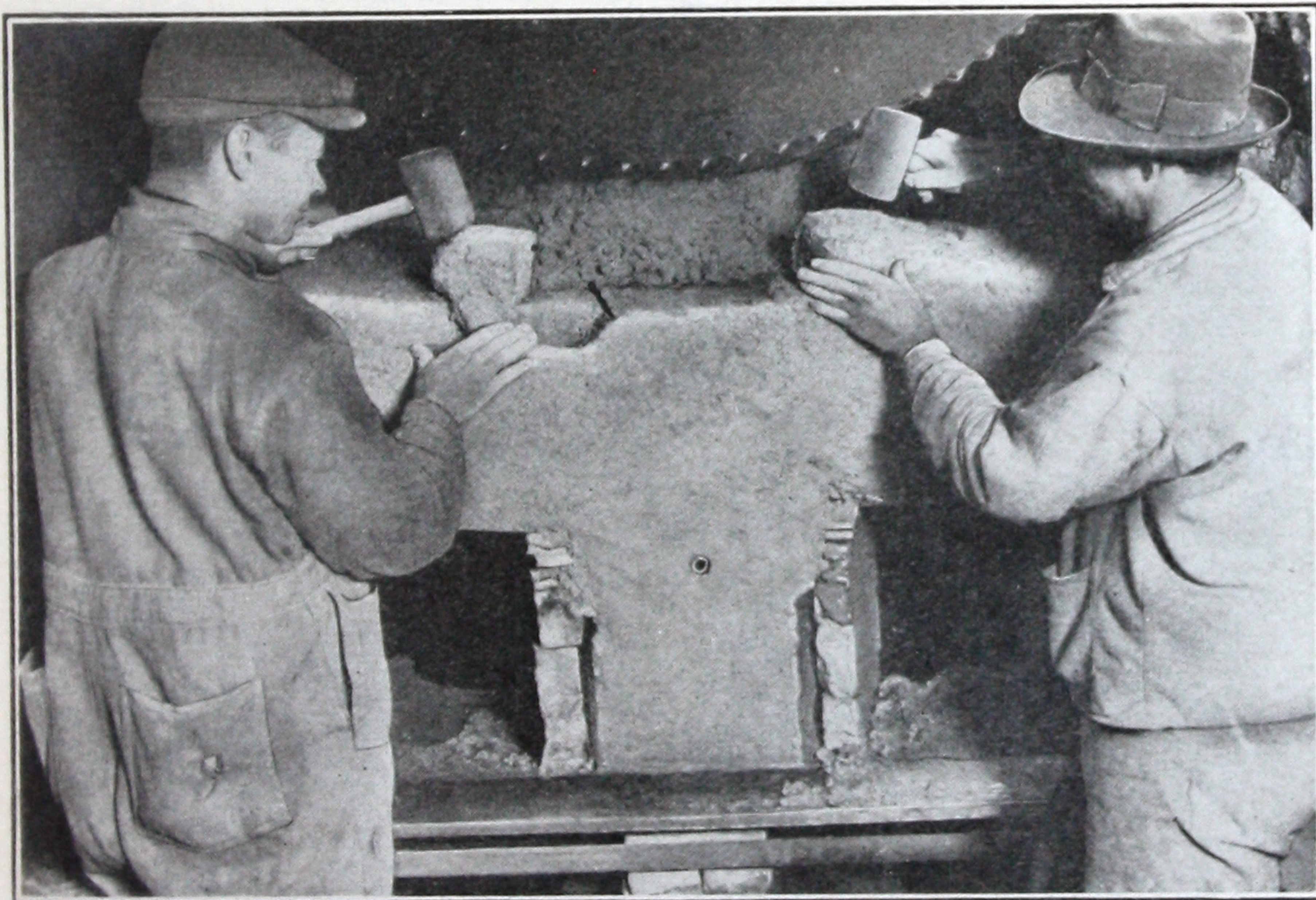
If the boiler rivets are further back than the back of the dead plate, gradually work the material out, so that they are well covered. When done, smooth the material up with a trowel.

DEVIL'S PUTTY

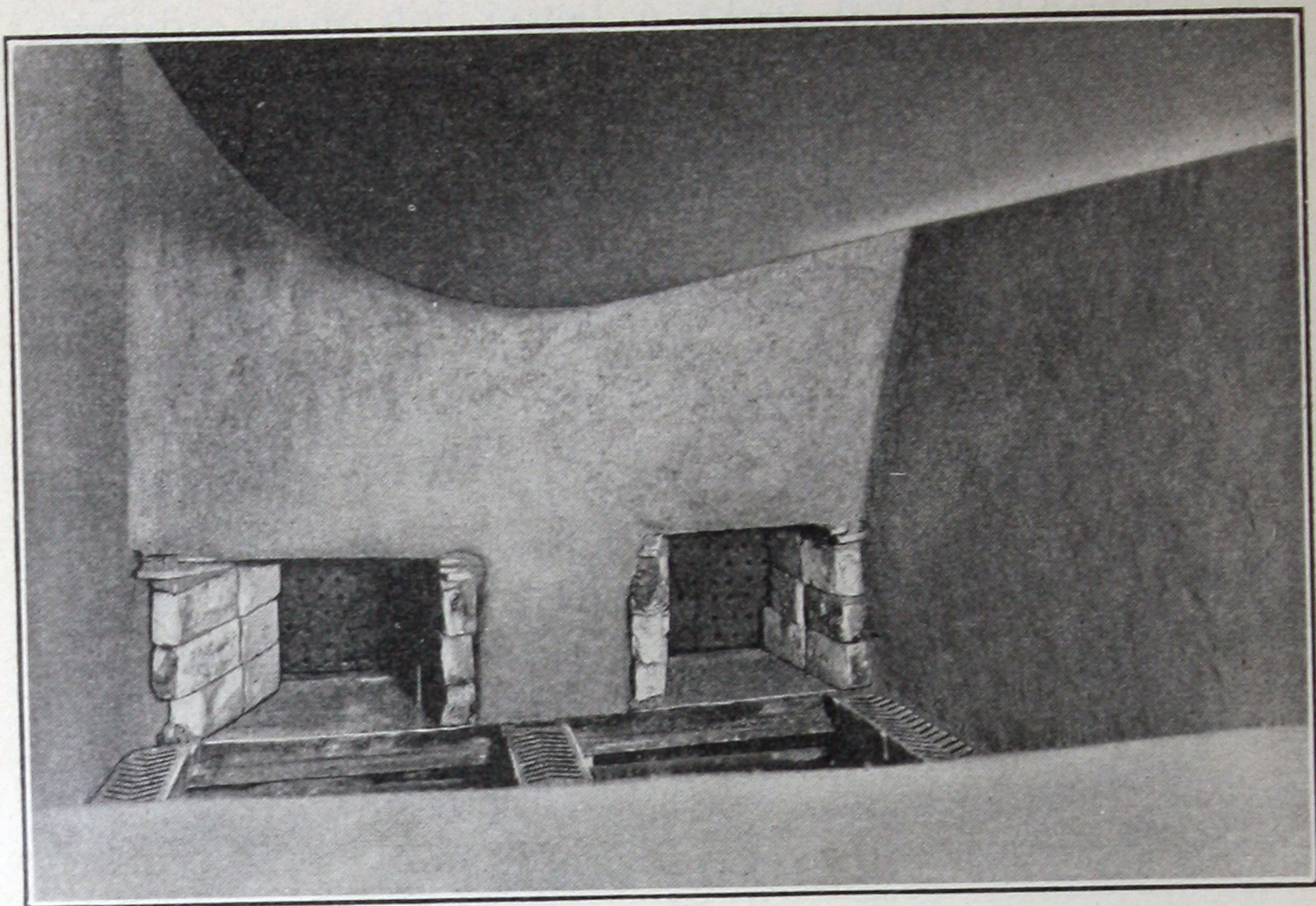
PLIBRICO will make a better job than ordinary fire brick, which laid up staggered give no protection to the projecting bricks and break off, whereas PLIBRICO makes a straight jointless setting without corners to be broken off.

The door jambs, also the arch over the doors, can be tapered off at a receding angle, giving a larger opening in back than in front and by rounding off the corners, it will do away with the continual knocking off of any square or sharp corners, which cannot be avoided with ordinary fire brick.

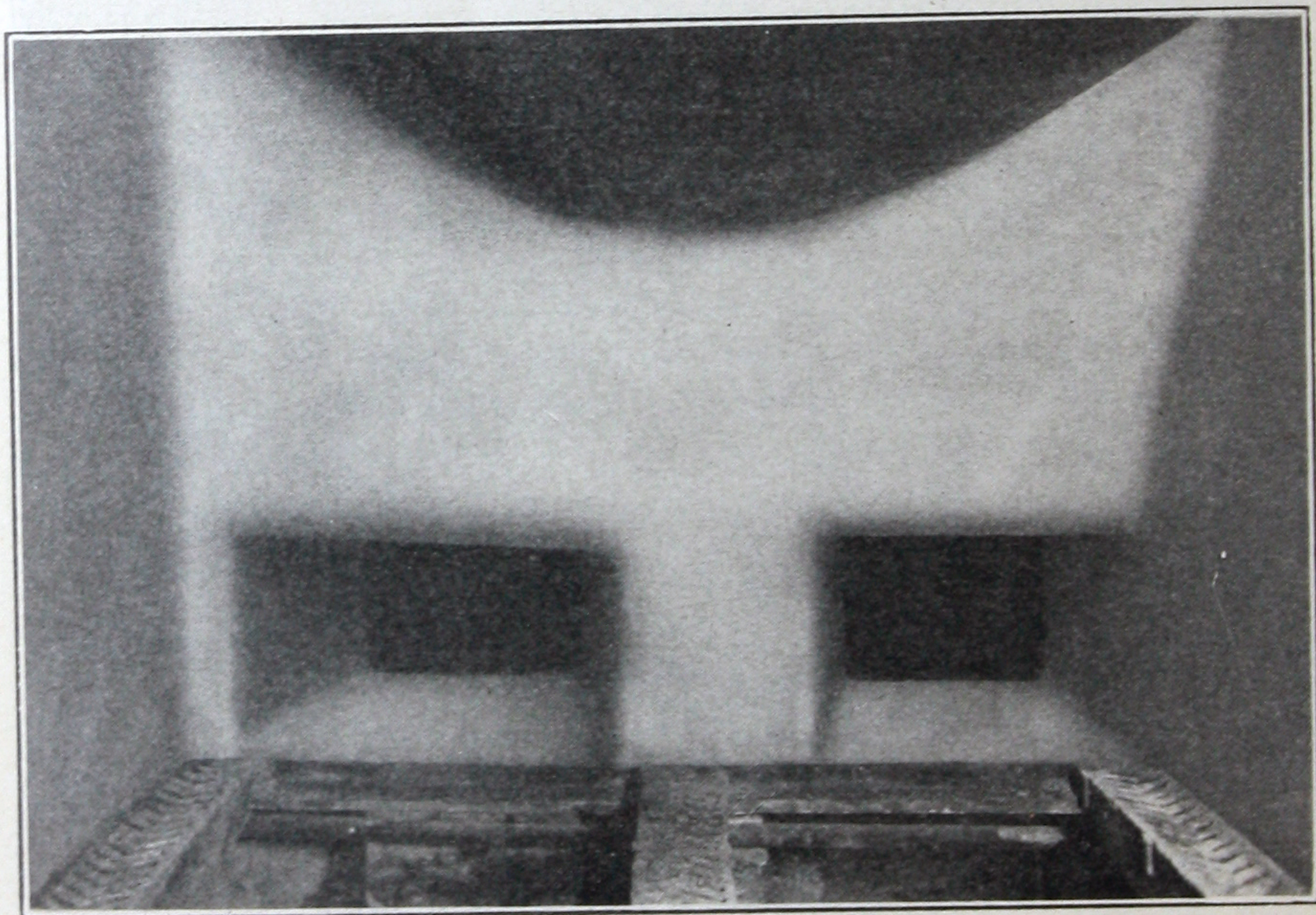
Our plan of using about two inches of rope asbestos next to the boiler shell and pounding the material up to this in order to keep the arch from being damaged by any expansion and contraction of the boiler is an excellent one.



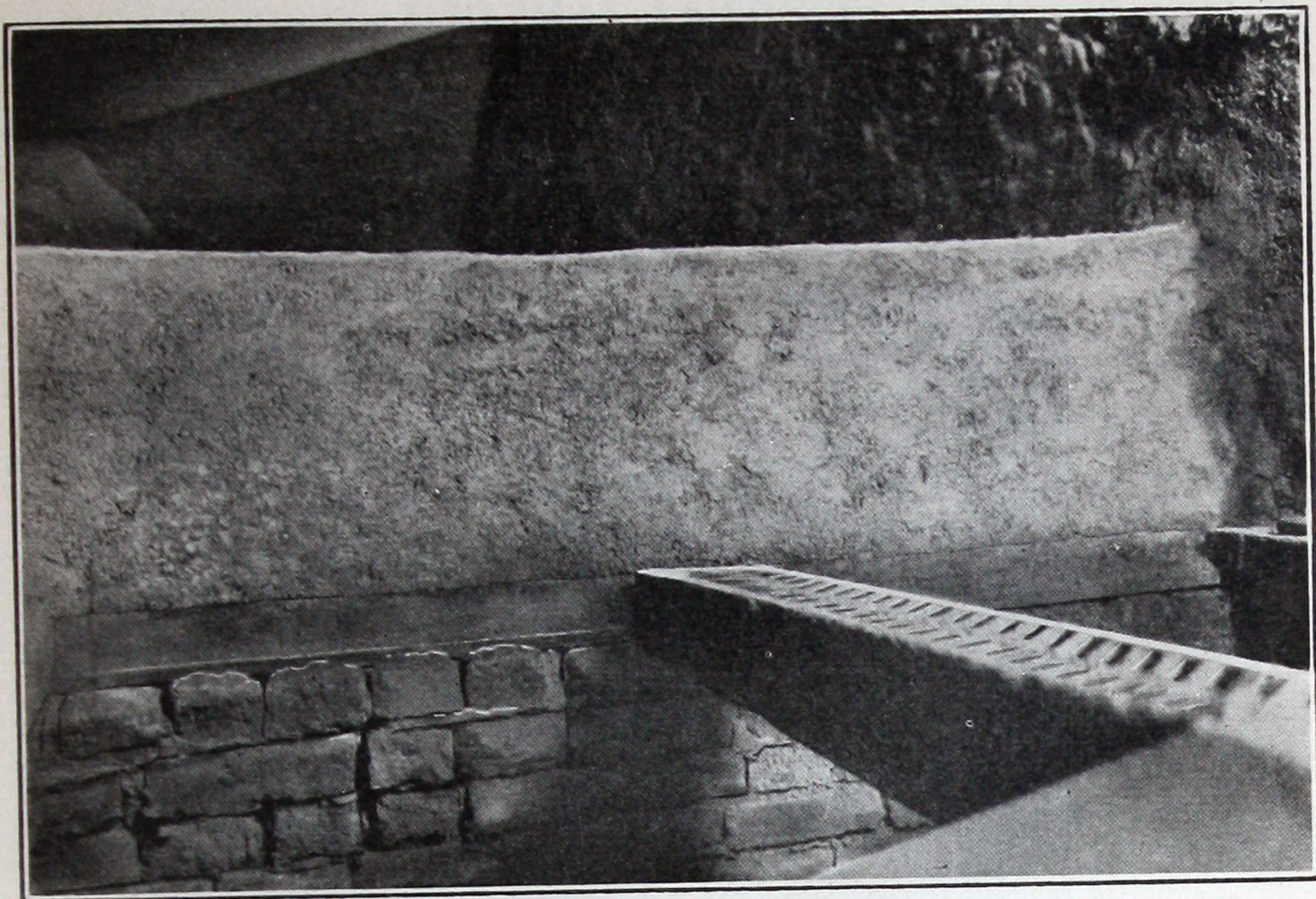
Front door arch partly built up showing how chunks of PLIBRICO are pounded into place. Note support as more particularly shown in illustration on preceding page.



Front door arch completely installed and ready to be dried out and baked.
Note support of arch which is removed only after complete
vitrification



Front door arch baked solid after temporary supports around doors
have been removed and arch is vitrified



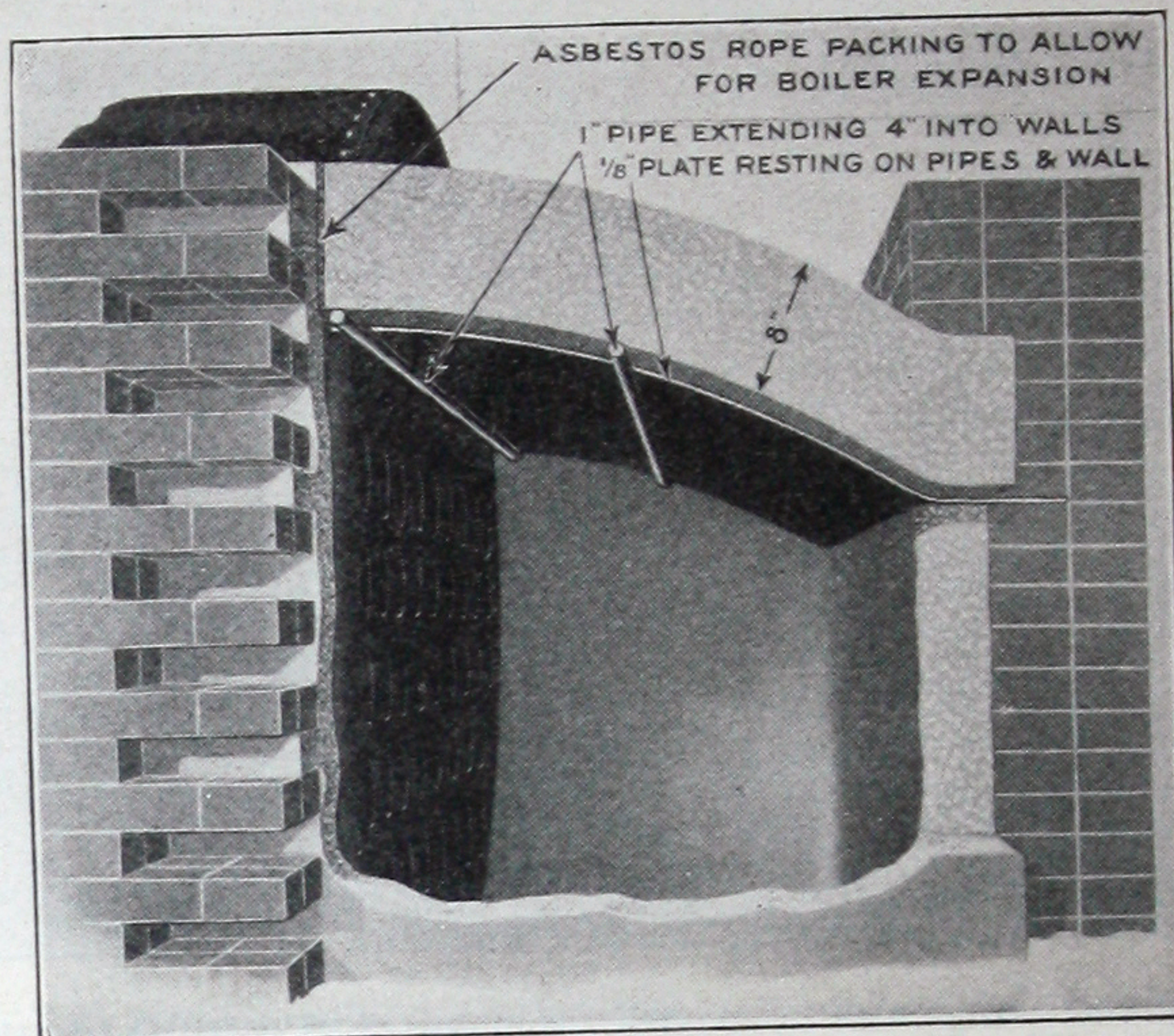
Completed bridge wall lined with $4\frac{1}{2}$ inches of PLIBRICO Jointless Fire Brick, forming a solid one piece covering.

Bridge Walls

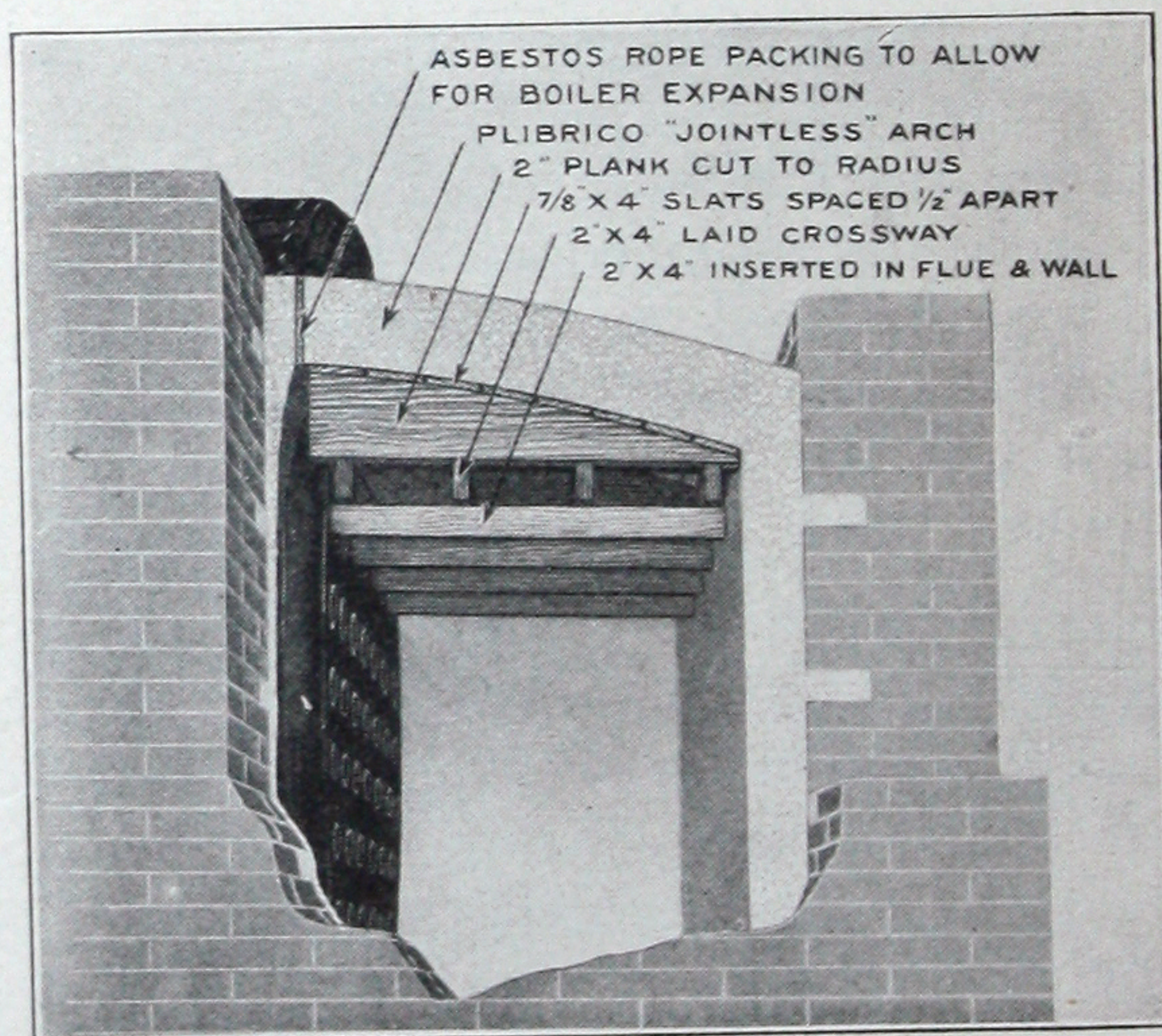
The old fire brick should of course be torn out and removed entirely and replaced with PLIBRICO thoroughly pounded together and then smoothed up with a trowel. To merely face same take **one layer** or more of the old fire brick (off the top and front) and face it either $4\frac{1}{2}$ or 9 inches thick (in any event not less than $4\frac{1}{2}$ inches).

We advise making the entire bridge wall of PLIBRICO, but in either case bear in mind that every chunk must be thoroughly tamped together to make a monolithic jointless bridge wall that will give you hard service under any conditions.

To insure arch against cracking by reason of expansion of boiler we suggest a layer of about 2 inches of asbestos rope between the arch and boiler shell

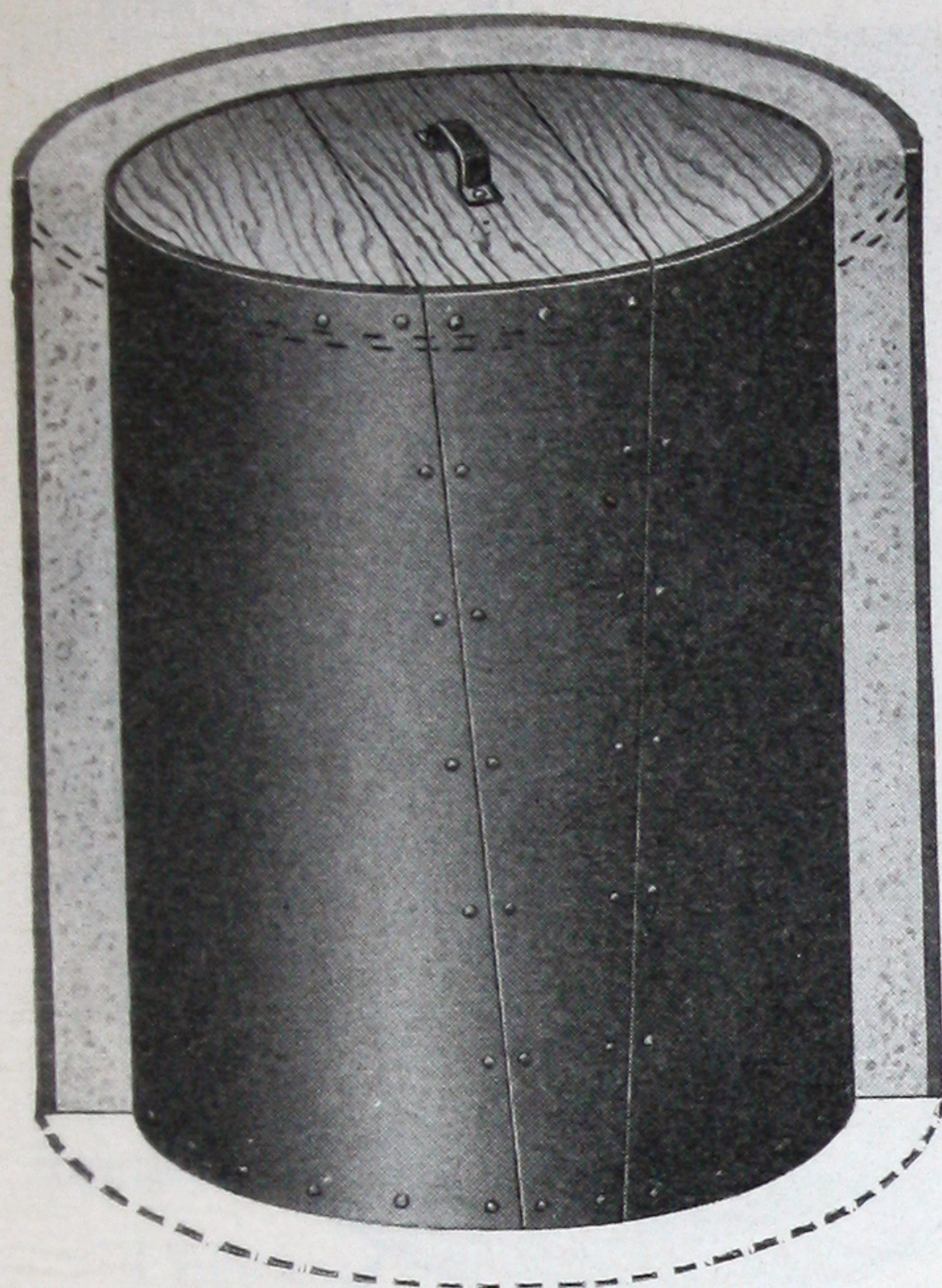


Our method of rear arch construction over combustion chamber, showing steel centering which is preferable as it cannot burn out while baking
 (Patent applied for)

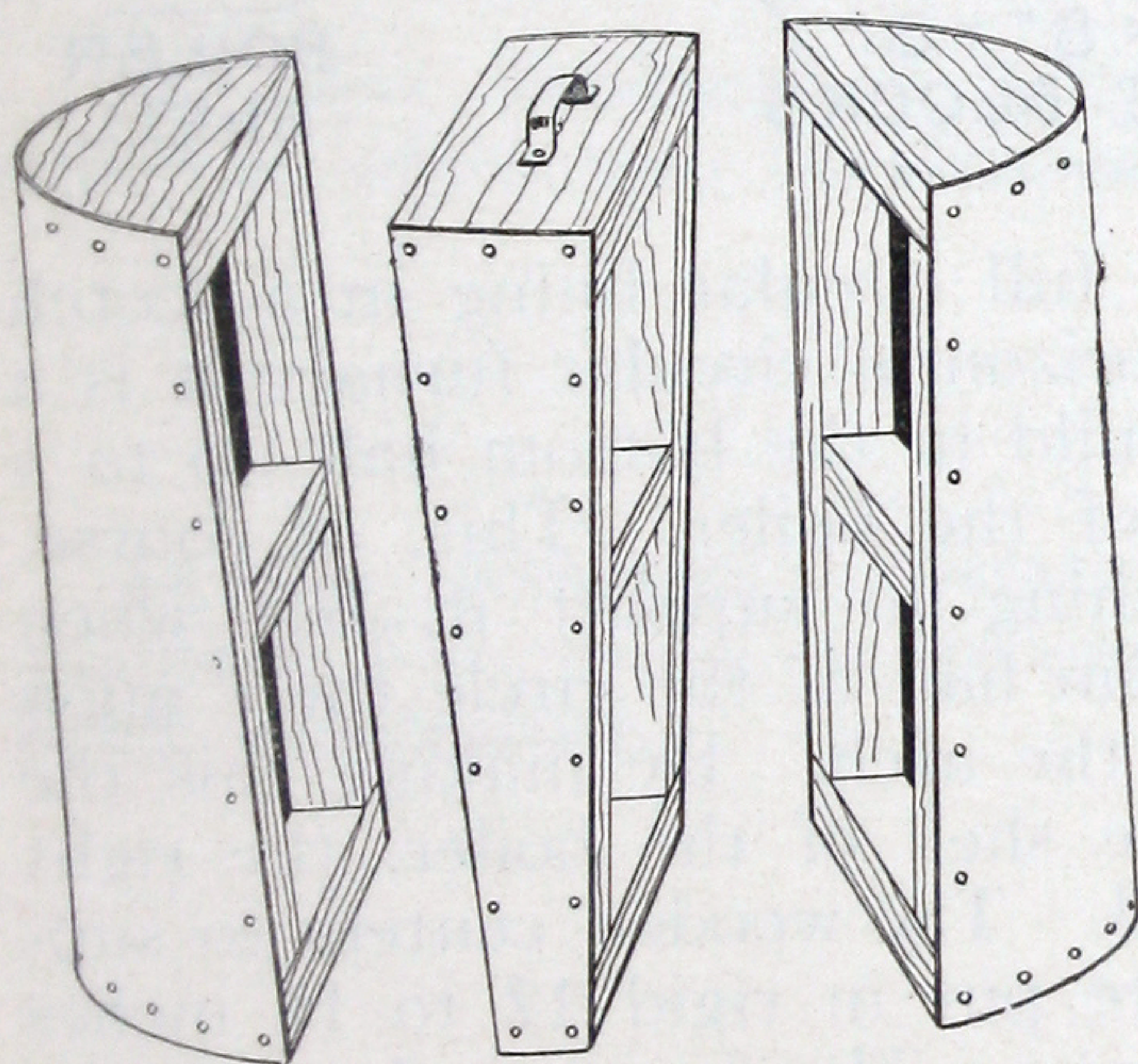


Our method of installing a rear arch with wooden centering. Can be used if the wood is not subjected to fire that will burn it out before the PLIBRICO has had a chance to bake hard enough to stand up by itself
 (Patent applied for)

Circular Furnaces



On this page we illustrate our method of lining circular furnaces by means of a removable collapsible core. PLIBRICO being first pounded in to make the bottom and then around the core between the core and shell. The core is then removed after the lining is thoroughly tamped in. After the lining is completed it is baked out and vitrified as usual.



(Patent applied for)

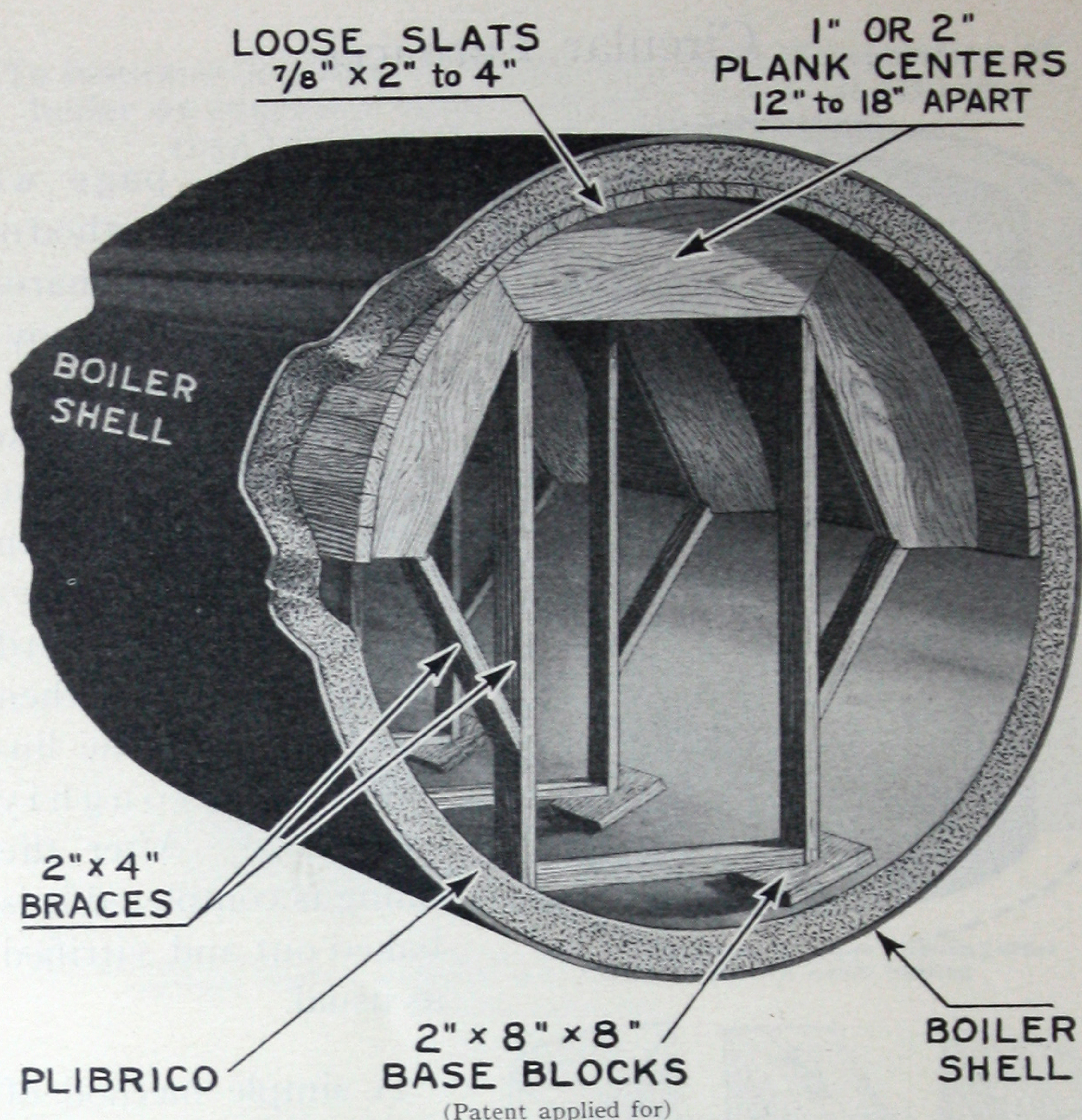
A simple method of getting a very serviceable **jointless fire brick lining** into any circular furnace or flue.

It is well to grease or oil the core so that the material will not adhere to same when removed.

Baffles

Baffles can be constructed of Plibrico Jointless Fire Brick by following the standard methods of concrete or cement wall construction.

PLIBRICO



In order to install a full circular lining in a scotch marine type boiler or horizontal circular furnace it is a very simple matter to build in the bottom half up to a little above the center of the boiler. This, of course, needs no form or anything to support it, but when getting beyond the bottom half of the circle there must be a centering to carry the arch. By making this the proper distance from the shell of the boiler, the right thickness will be secured. The wooden centers to support the $2'' \times \frac{7}{8}''$ slats are put in rigid 12 to 18 inches apart so they will not move. The first few slats can be nailed on the form and then as the work progresses on up, the slats are put in place loose on the form, one after another, so that the PLIBRICO can be pounded in behind the slats until the top is finally reached. PLIBRICO will have to be filled into the small remaining space at the top by shoving and pounding it in to finish the complete circular lining.

DEVIL'S PUTTY

PLIBRICO JOINTLESS FIRE BRICK is a high grade refractory furnace lining. It will make a good complete installation and is especially adapted for front door arches, baffles, combustion chamber arches, side walls, bridge walls and linings **for all kinds of furnaces and ovens and wherever fire brick can be used.**

Such a lining produces British Thermal Units, Horsepower and Amperes.

The proof is in your instruments for measuring and testing the efficiency of your plant. From the fuel saving point of view this material is not an expense, but a real investment.

Plibrico Has Given Universal Satisfaction

We have furnished the linings for all kinds of boiler settings, furnaces and ovens, including a large number of furnaces in munition plants.

Plibrico is used in all kinds of industrial plants, public and private institutions.

We have hundreds of letters from satisfied users, copies of which may be had upon request.

In the remaining illustrations the use of Plibrico Jointless Fire Brick is recommended wherever Fire Brick is indicated.

(Reprinted by courtesy of the Smoke Prevention Association)

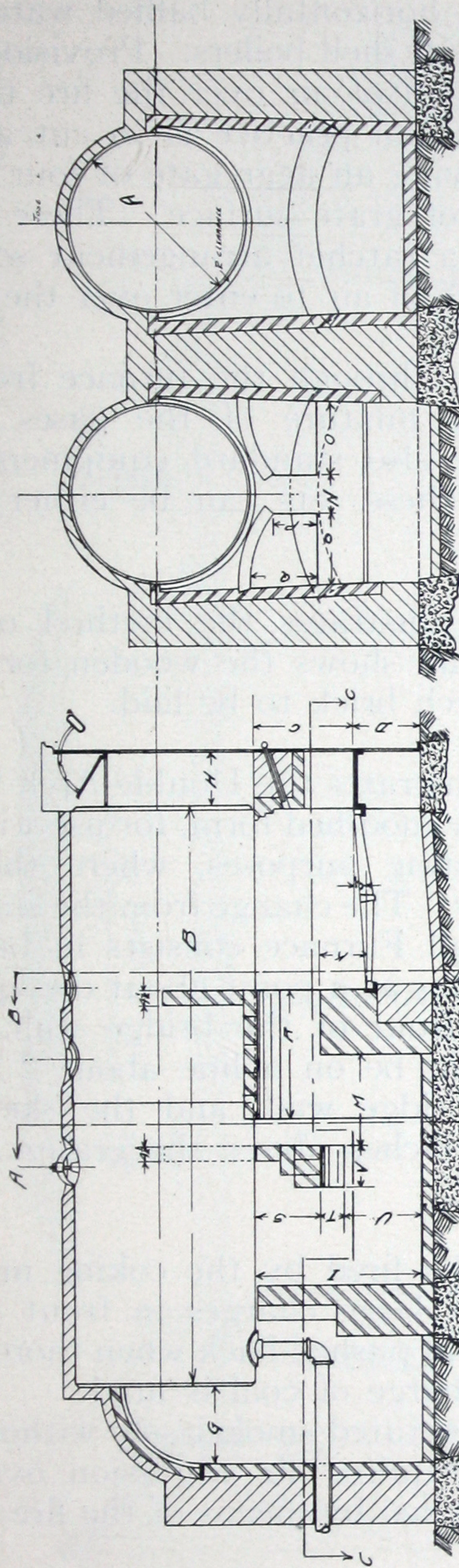
Hand-Fired Furnaces

Where load conditions and nature of fuel do not require hand-fired furnaces, and size of unit is more than 150 H. P. capacity, it is recommended that mechanical stokers be used.

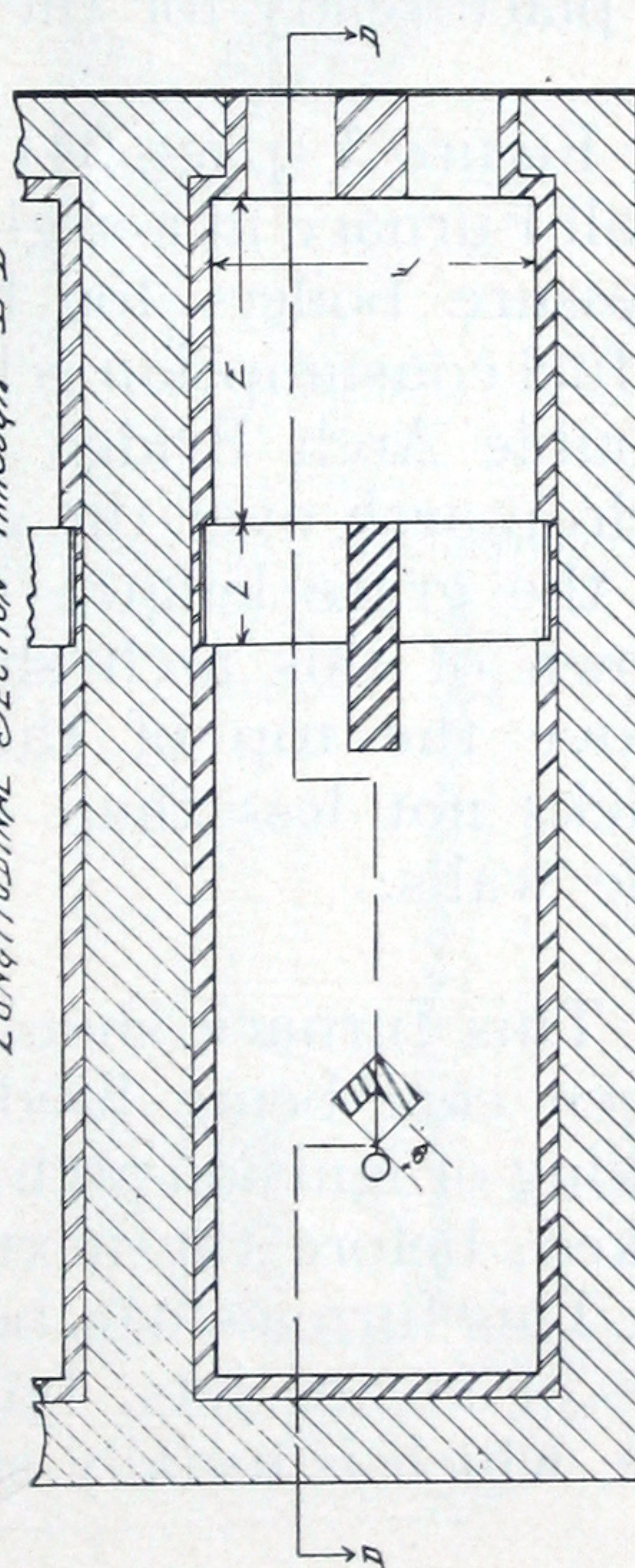
Figure 1 (page 21) shows a plan and three sections of a furnace commonly known as the Double Arch Bridge Wall. As can be seen from section BB, the construction consists of two arches which are supported on one side by means of a center pier and on the other side rest on the side walls of the boiler setting. These arches extend from the front of the bridge wall to a point in back of the bridge wall, as seen in section DD.

Behind the double arch there is constructed a deflection arch which is built in one or two spans, depending upon the width of the combustion chamber. The double arch forms two retorts over the bridge wall, the combined area of which is about 25 per cent of the grate area. Thus, the gases from every portion of the grate are forced together intimately in these two retorts. The center pier assists in this intimate mixture by splitting the volume of gases leaving the fuel bed into halves, while the gases hugging the shell over the grate are compelled to descend and enter this high temperature zone in the retorts. The gases will thus separate into two volumes which are compelled to travel through fire brick inclosed chambers, which effects a rise in the temperature of the gases, which are then projected against a diaphragm or deflection arch made of refractory material. This compels the whole volume of gas to change its direction of travel by 90 degrees or through a right angle. The area under this deflection arch is made double that over the bridge wall, so as to allow for the secondary combustion resulting from the mixture of the two separate volumes as well as from the mixture caused by the deflection arch. The gases allowed to expand uniformly from this point on are distributed over the heating surface.

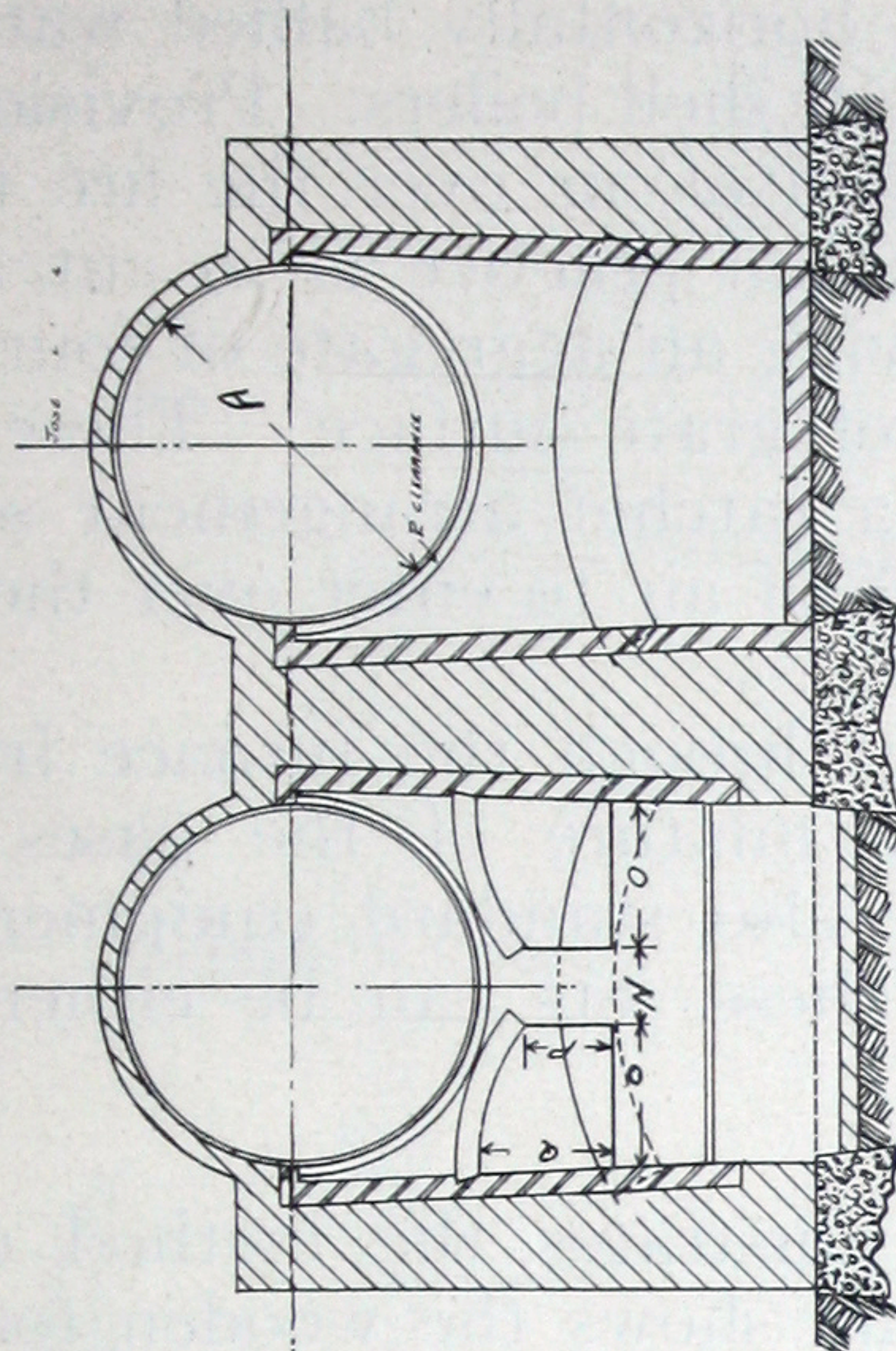
(Continued on page 22)



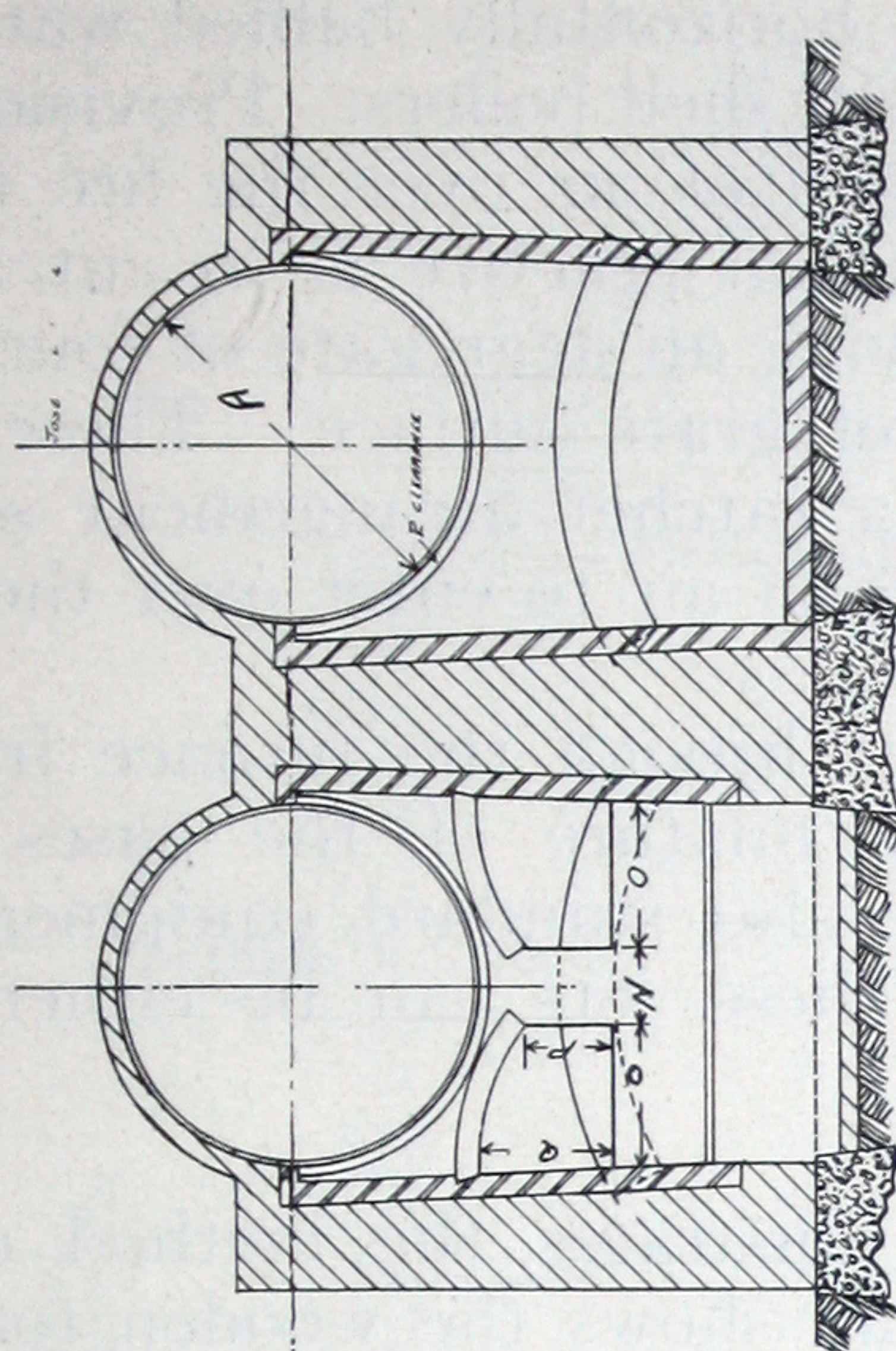
LONGITUDINAL SECTION THROUGH "D-D"



PLAN SECTION THROUGH "C-C"



SECTION THROUGH "B-B"



SECTION THROUGH "A-A"

DIMENSION SHEET FOR DEPARTMENT NO. 6 FURNACE																									
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
42	12.0	28	19	42	42	22	16	44	4	35	12	21	9	16	9	17	27	17	8	19	19	19	19	19	19
42	14.0	28	19	48	42	22	16	44	4	35	12	21	9	16	9	17	27	17	8	19	19	19	19	19	19
48	12.0	30	20	42	48	24	18	45	3	35	12	21	9	16	9	17	27	17	8	19	19	19	19	19	19
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54	14.0	32	22	48	54	24	18	45	3	35	12	21	9	16	9	17	27	17	8	19	19	19	19	19	19
54	16.0	32	22	54	54	24	18	45	3	35	12	21	9	16	9	17	27	17	8	19	19	19	19	19	19
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60	18.0	34	22	66	60	26	18	60	5	17	22	26	13	23	13	23	36	24	10	23	19	19	19	19	19
66	16.0	34	24	60	66	28	18	55	5	17	22	26	13	23	13	23	36	20	11	23	19	19	19	19	19
66	18.0	34	24	66	66	28	18	55	5	17	22	26	13	23	13	23	36	20	11	23	19	19	19	19	19
72	16.0	36	24	66	72	30	20	55	5	17	22	26	13	23	13	23	36	20	11	23	19	19	19	19	19
72	18.0	36	24	72	72	30	20	55	5	17	22	26	13	23	13	23	36	20	11	23	19	19	19	19	19
78	18.0	38	26	72	78	32	21	65	6	19	26	32	18	30	18	28	45	26	12	28	19	19	19	19	19
78	20.0	38	26	78	78	32	21	70	6	19	26	32	18	30	18	28	45	27	12	28	19	19	19	19	19
84	18.0	38	26	72	84	32	21	64	6	20	26	36	18	33	14	27	45	24	12	28	19	19	19	19	19
84	20.0	38	26	78	84	32	21	69	6	20	26	36	18	33	14	27	45	24	12	28	19	19	19	19	19

NOTE: DIMENSIONS IN THE ABOVE TABLE APPLY ONLY FOR THE STANDARD CONDITIONS AND ARE SUBJECT TO REVISION FOR VARIOUS CONDITIONS.

FIG. 1

The boiler shell with this type of furnace is entirely exposed over the grate. This type of furnace can be used in connection with horizontally baffled water tube boilers as well as horizontal shell boilers. Provision must be made for the admission of air over the fire through the fire doors and the usual practice is to cut a panel opening in the doors having an aggregate of four square inches per square foot of grate surface. These panels are usually fitted with a ratchet arrangement so as to allow the desired amount of air to enter over the fire.

Steam jets extending through the furnace front for obtaining a preliminary mixture of the gases before entering the retorts, are also standard equipment with this type of furnace. These jets can be either hand-operated or automatic.

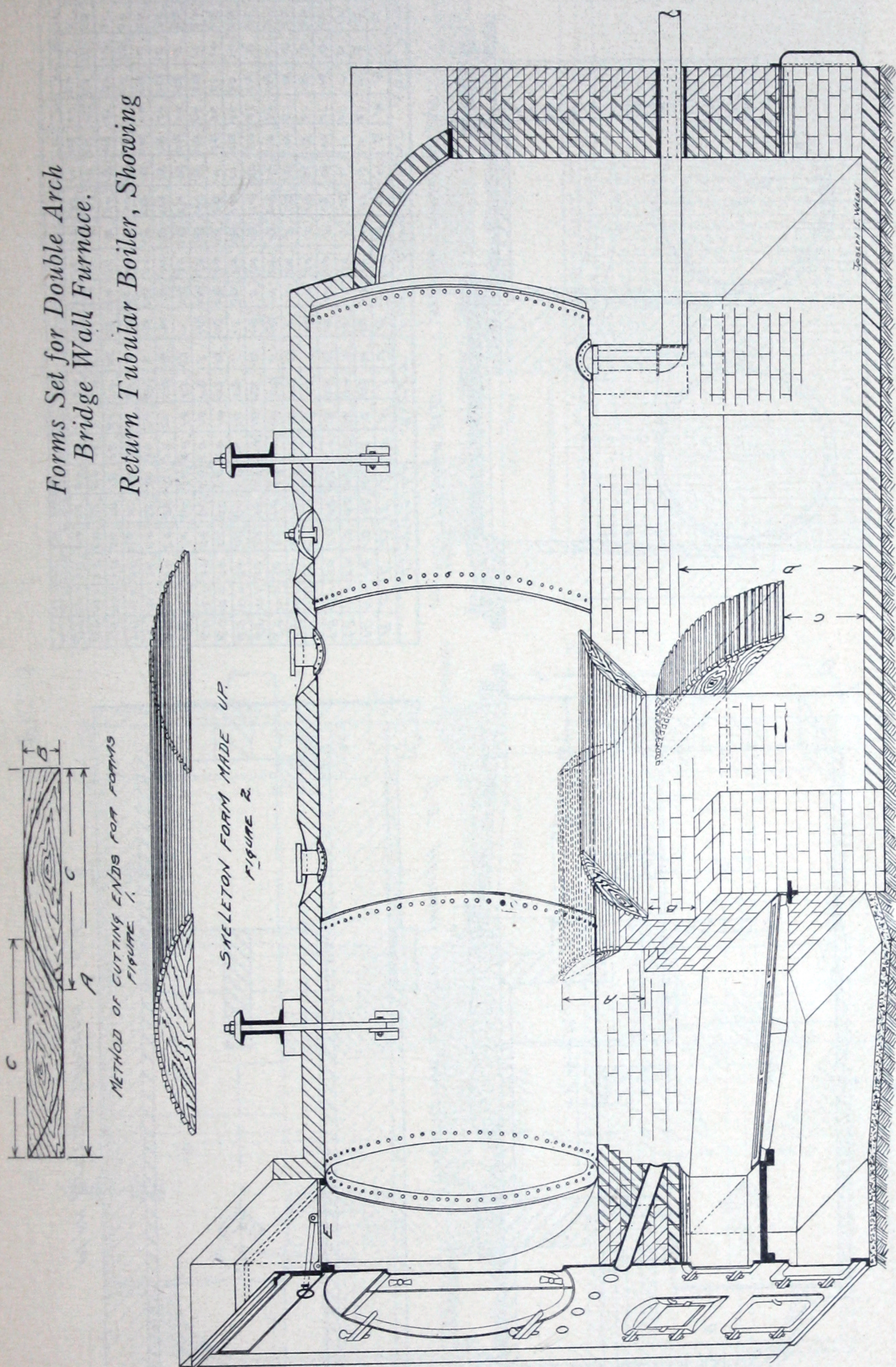
Figure 2 (page 23) illustrates the method of constructing this furnace, and shows the wooden forms set in place ready for the arch brick to be laid.

Figure 3 (page 24) illustrates the Double Arch Bridge Wall Furnace in a slightly modified form, for use with low pressure boilers for heating purposes, where the rate of fuel consumption is low. The change from the standard Double Arch Bridge Wall Furnace consists in building a drop arch over the grates at a point about one-quarter of the grate length, in front of the bridge wall. The crown of this arch should be on a line about 2 inches above the top of the bridge wall, and the skewback bricks not less than 12 inches above the grates at the side walls.

This furnace should be fired by the coking method, green coal being fired in large charges in front of the coking or ignition arch, and pushed back when thoroughly coked, before the next charge of coal is fired.

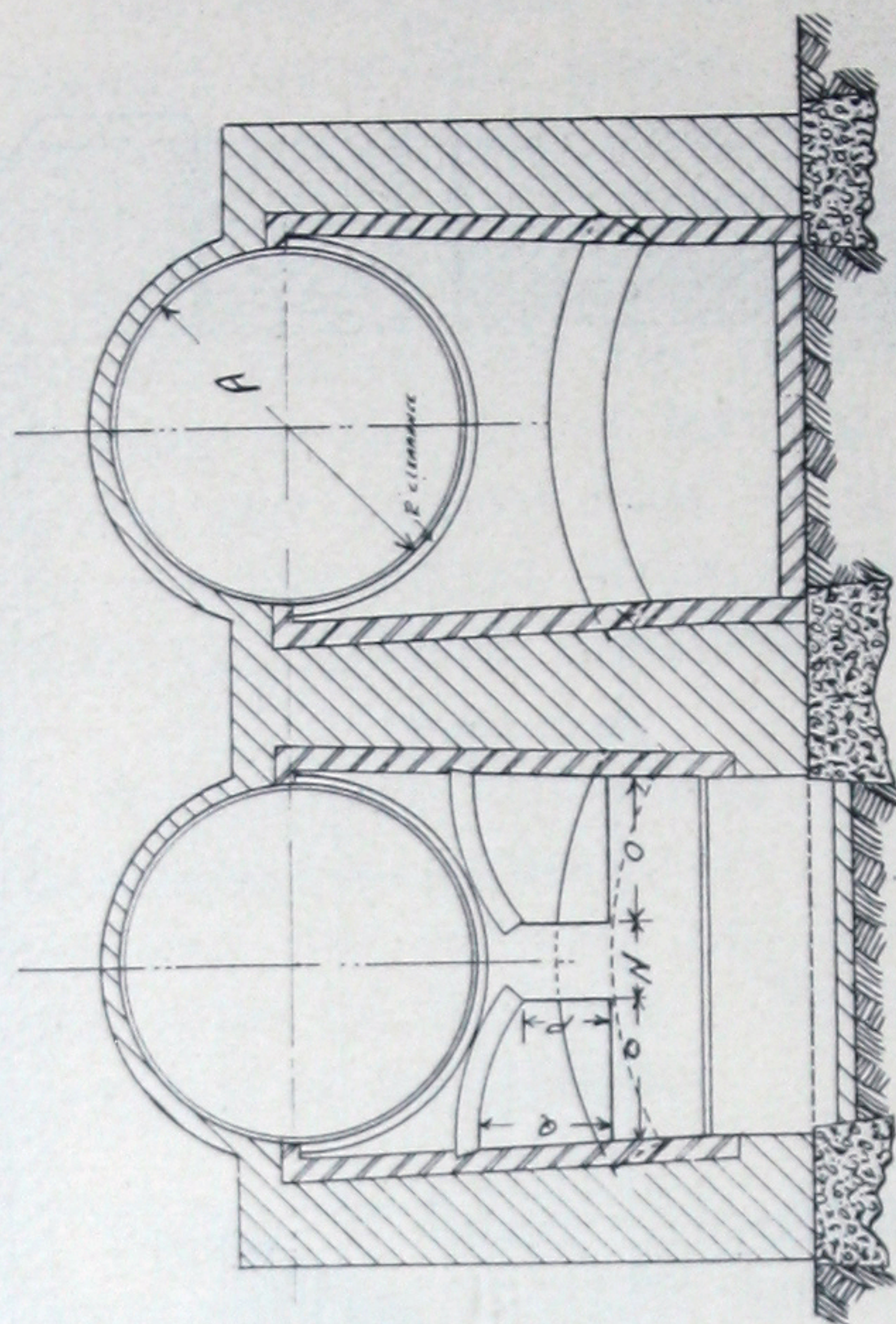
This furnace can be operated smokelessly without the use of steam jets, but requires air admission over the fire, which is usually supplied by means of the fire doors.

(Continued on page 26)



Forms Set for Double Arch
Bridge Wall Furnace.
Return Tubular Boiler, Showing

FIG. 2—Longitudinal Section Through Setting



SECTION THROUGH B.B. SECTION THROUGH A.A.

DIMENSION SHEET FOR DEPARTMENT NO. 6 FURNACE																									
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
42	12.0	28	19	42	42	22	16	16	32	12	18	21	9	16	9	15	27	15	8	19	13	8	8	8	8
42	14.0	28	19	48	42	22	16	16	32	12	18	21	9	16	9	15	27	15	8	19	13	8	8	8	8
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60	16.0	34	22	60	60	26	18	18	32	12	18	24	9	16	9	15	27	15	8	19	13	8	8	8	8
60	18.0	34	22	66	60	26	18	18	32	12	18	24	9	16	9	15	27	15	8	19	13	8	8	8	8
66	16.0	34	24	60	66	28	18	18	32	12	18	24	9	16	9	15	27	15	8	19	13	8	8	8	8
66	18.0	34	24	66	66	28	18	18	32	12	18	24	9	16	9	15	27	15	8	19	13	8	8	8	8
72	16.0	36	24	66	72	30	20	20	32	12	18	24	9	16	9	15	27	15	8	19	13	8	8	8	8
72	18.0	36	24	72	72	30	20	20	32	12	18	24	9	16	9	15	27	15	8	19	13	8	8	8	8
78	18.0	38	26	72	78	32	21	21	32	12	18	24	9	16	9	15	27	15	8	19	13	8	8	8	8
78	20.0	38	26	78	78	32	21	21	32	12	18	24	9	16	9	15	27	15	8	19	13	8	8	8	8
84	18.0	38	26	72	84	32	21	21	32	12	18	24	9	16	9	15	27	15	8	19	13	8	8	8	8
84	20.0	38	26	78	84	32	21	21	32	12	18	24	9	16	9	15	27	15	8	19	13	8	8	8	8

PLAN SECTION THROUGH "C-C."

LONGITUDINAL SECTION THROUGH "D-D"

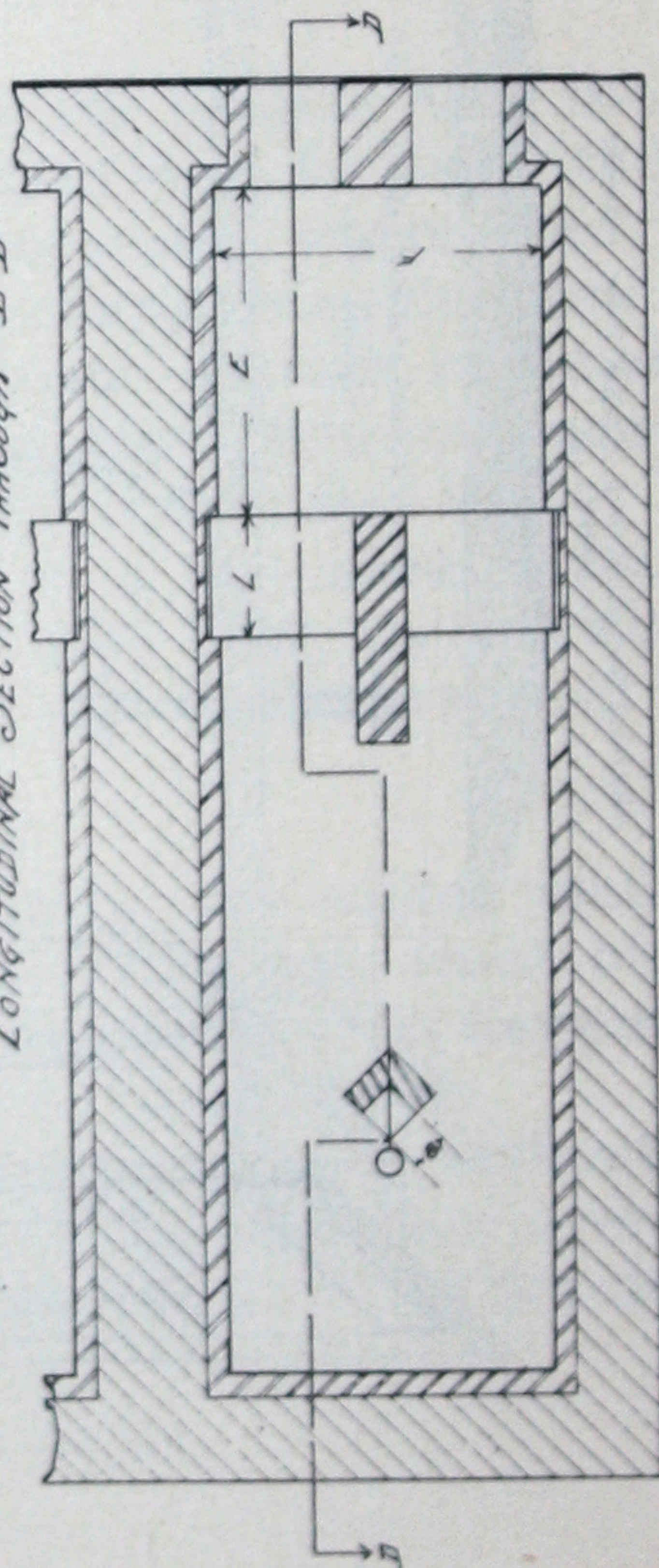
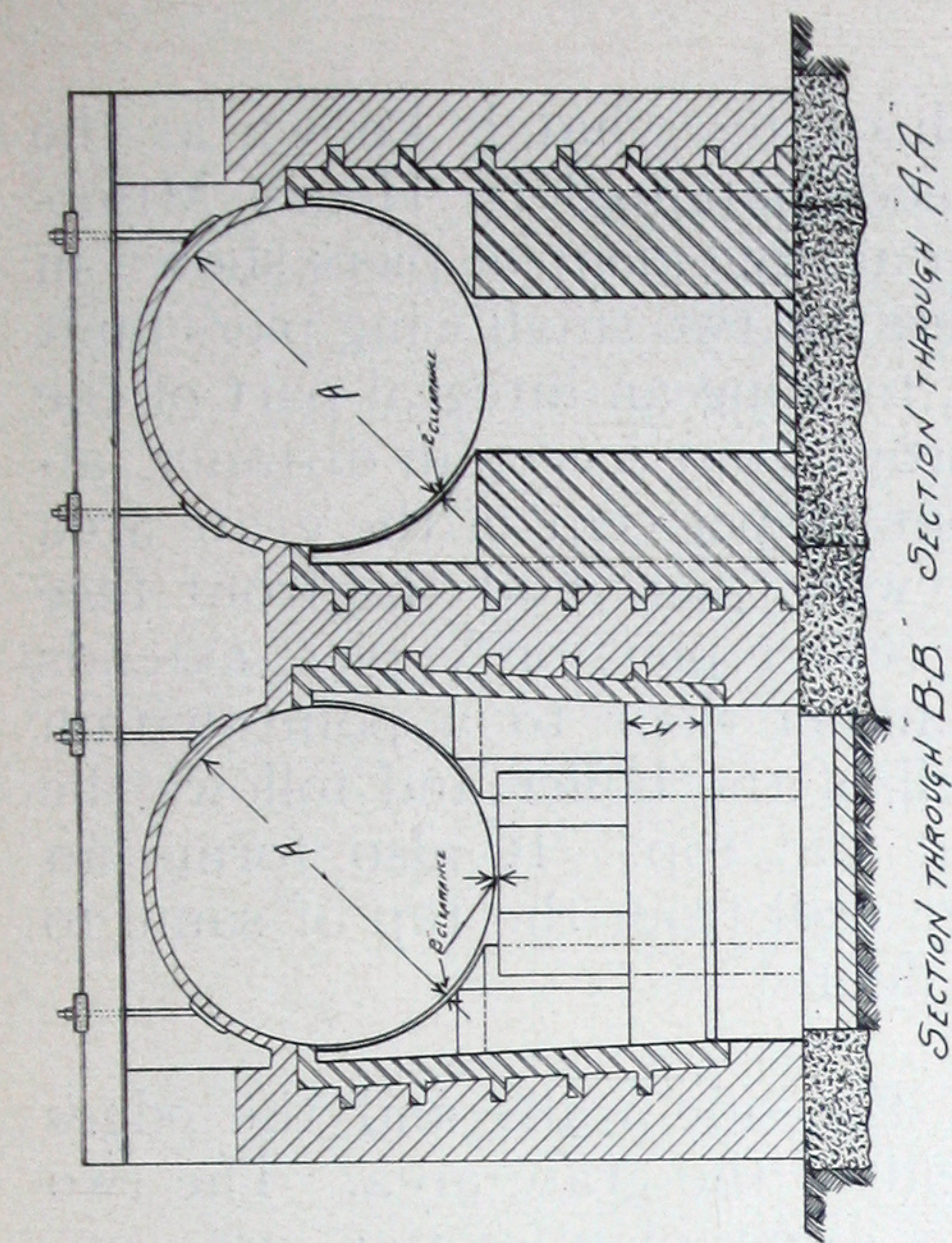


FIG. 3

DEVIL'S PUTTY



DIMENSION SHEET FOR DEPT. NO. 8 FURNACE.																									
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
42	12	28	19	42	42	22	16	44	31	15	16	16	7	9	11	9	5	13	16	27	6	18	8		
42	4	28	19	48	42	22	16	50	4	15	17	16	7	9	11	9	5	13	16	27	5	18	8		
48	12	30	20	42	48	24	18	45	31	16	17	16	7	9	12	9	7	15	16	31	8	18	8		
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60	18	34	22	66	60	26	18	60	5	17	22	15	9	12	15	13	15	17	26	34	8	22	8		
66	16	34	24	66	66	28	18	53	5	18	21	17	9	13	15	15	18	30	35	9	22	8			
66	18	34	24	66	66	28	18	58	5	18	21	17	9	13	15	15	18	30	35	9	22	8			
72	16	36	24	66	72	30	20	59	5	18	23	18	11	14	15	16	20	32	39	9	22	8			
72	18	36	24	72	72	30	20	67	6	18	24	18	11	14	15	16	20	32	39	9	22	8			
78	16	38	26	72	78	32	21	62	6	18	26	20	13	14	15	18	21	36	41	9	24	8			
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84	16	38	26	84	84	32	21	60	6	18	26	22	13	15	15	18	22	40	42	11	24	8			
84	18	38	26	84	84	32	21	66	6	18	26	22	13	15	15	18	22	40	42	11	24	8			

Patented by H. Misostow.

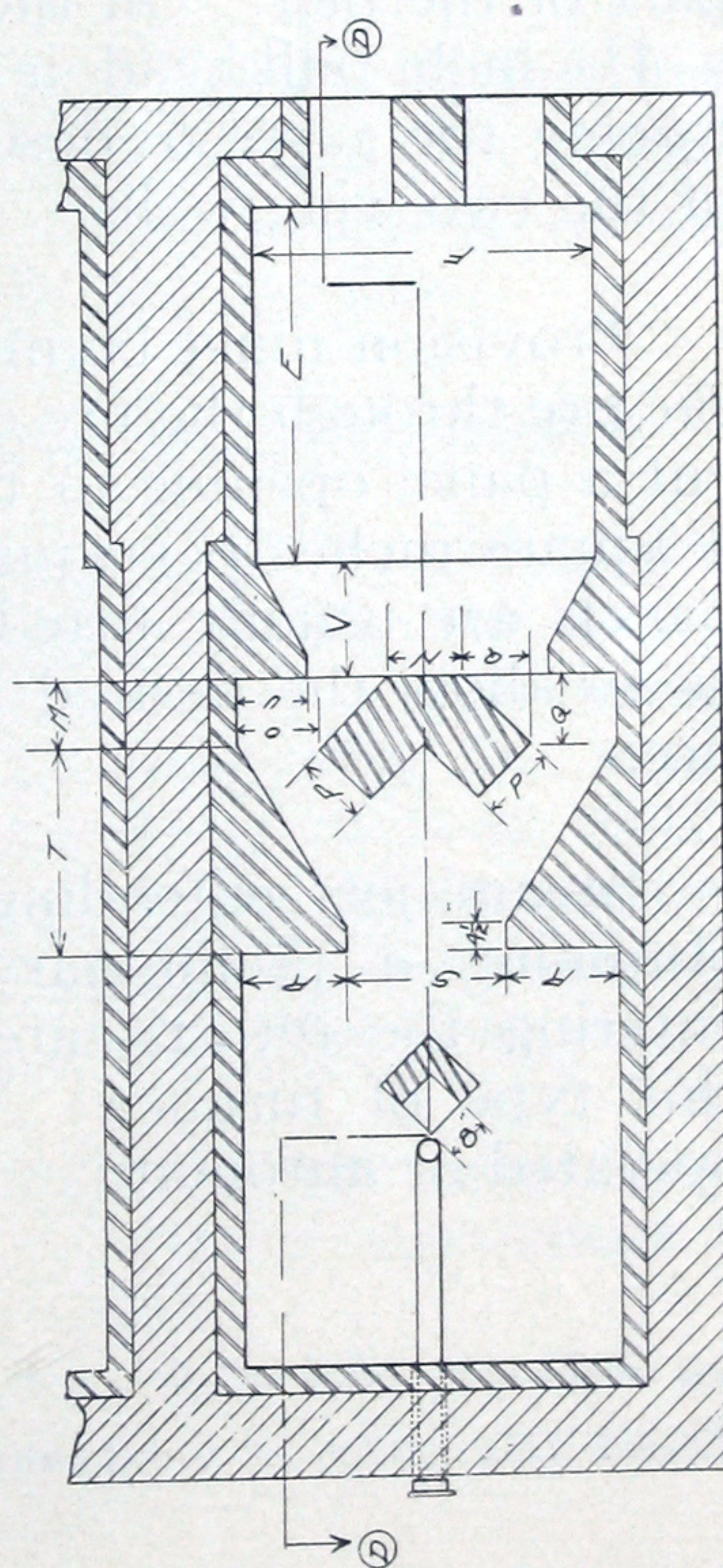
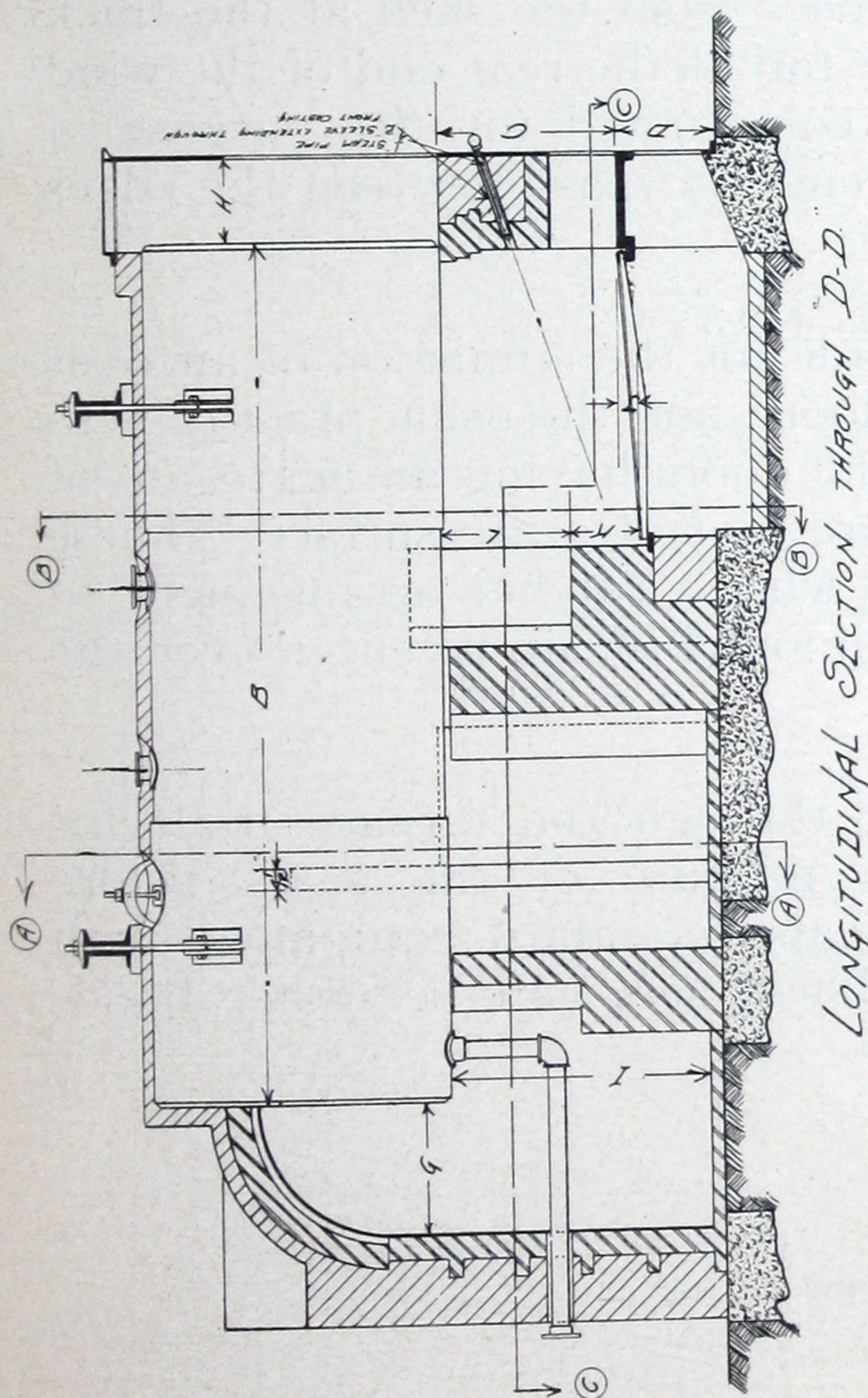


FIG. 4
PLAN SECTION THROUGH C-C

Figure 4 (page 25) illustrates what is known as the Department No. 8 Furnace (patented by Henry Misostow). This consists of an arrangement of piers shown in the plan section CC. There are two small wing piers built on top of the bridge wall, forming an integral part of the side walls. These piers project out a certain distance, allowing an opening of about 20 per cent of the grate area between the edge of the wing piers and the front face of the center pier. This center pier, or V pier, extends from the combustion chamber floor to a point within about 2 inches of the shell of the boiler and follows the curvature of the shell at the top. It also forms an integral part of the bridge wall from the top of same to the combustion chamber floor.

The opening between the side walls and the edges of the V pier is 25 per cent of the grate area. The two wing piers shown in the same plan section are constructed in the combustion chamber and extend from the floor to a point 2 inches from the shell at the thick part of the pier. On the top of the rear end of the wind a 4½-inch bulkhead is constructed for the purpose of forcing the gases to descend and pass between the edges of the two wing walls.

Provision must be made for the admission of air over the fire through the fire doors, and the usual practice is to cut a panel opening in the doors having an aggregate of 4 square inches per square foot of grate surface. These panels are usually fitted with a ratchet arrangement so as to allow the desired amount of air to enter over the fire.

Steam jets extending through the furnace front for obtaining a preliminary mixture of the gases before entering the retorts, are also standard equipment with this type of furnace. These jets can be either hand-operated or automatic.

(Continued on page 30)

DEVIL'S PUTTY

the moisture thaws out first and comes to the surface. It therefore is important that the thawing be continued until all the moisture is again absorbed. The material will return to its **original stiff plastic condition** when the moisture is all taken up.

Storing

Keep in cool but not freezing place, to avoid having same dry out as much as possible. Keep barrel covered with burlap, dampen occasionally and material will always be ready to use.

Surface Cracks

Should any small crack or check appear during drying, rub a little of the PLIBRICO or dissolve a little to the consistency of a thick grout and apply with a brush until the cracks are filled in.

Plibrico

can be used in all cases where laid up fire brick is used and will be found far superior to ordinary fire brick.

It should **not** be used as boiler covering or pipe covering, as it is not intended for this purpose.

How to Estimate Your Requirements

Plibrico comes in barrels of from 500 to 650 pounds, in a stiff, moist, plastic consistency—ready for use. It weighs 120 pounds to the cubic foot. The amount required is easily estimated by measuring its length, thickness and height of the particular arch or wall to be installed or replaced, thus arriving at the contents (expressed in cubic feet) then multiply the cubic feet by 120 lbs. to the cubic foot, which will give you the number of pounds required.

If any of the material should be left over, it will not deteriorate or be wasted. It will be convenient for patching and repairing at any time.

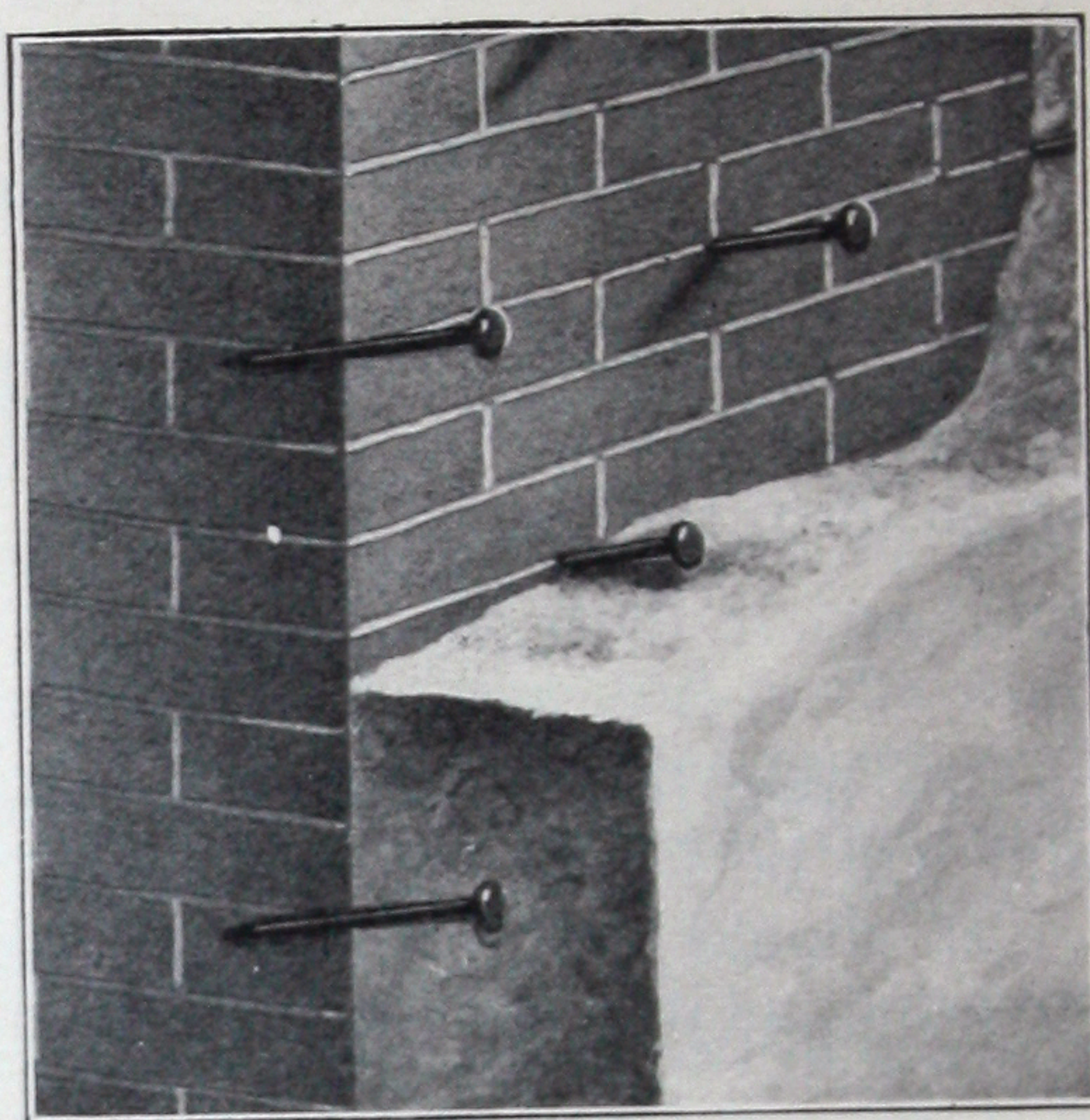
The Jointless Fire Brick Company will furnish estimates from blue prints and be pleased to give any further information that may be desired.

Side Walls

Start your side wall at the top of the grates and work up, a chunk at a time, each chunk being thoroughly pounded and worked into it. Having removed the headers and brushed or slushed the common brick with a thin PLIBRICO grout for a binder, pound into the pockets left by the removed headers.

Two boards, five or six inches wide can be used for forms in order to get a smooth job.

Remove the lower board leaving the one at the top. Fill in the material and pound it thoroughly as you build up, after getting form and shape, until the side wall is completed. Under no circumstances should the side wall be less than $4\frac{1}{2}$ inches thick anywhere, and we recommend six and even nine inches for a very good job, according to the temperature that will be required of same.



Our method of anchoring PLIBRICO in cases where wall runs up over five feet
(Patent applied for)

The wall will carry its own weight up to about 5 feet in height. Should your side walls have to be run up higher than this, we suggest the use of our plan of driving a sufficient number of spikes thru the lining at a slightly inclined angle into the common bricks to anchor it. These spikes can be left to burn out and need not be driven in any more than to serve as anchors and bracing to hold it. The fire will melt and burn off all spikes sticking out.

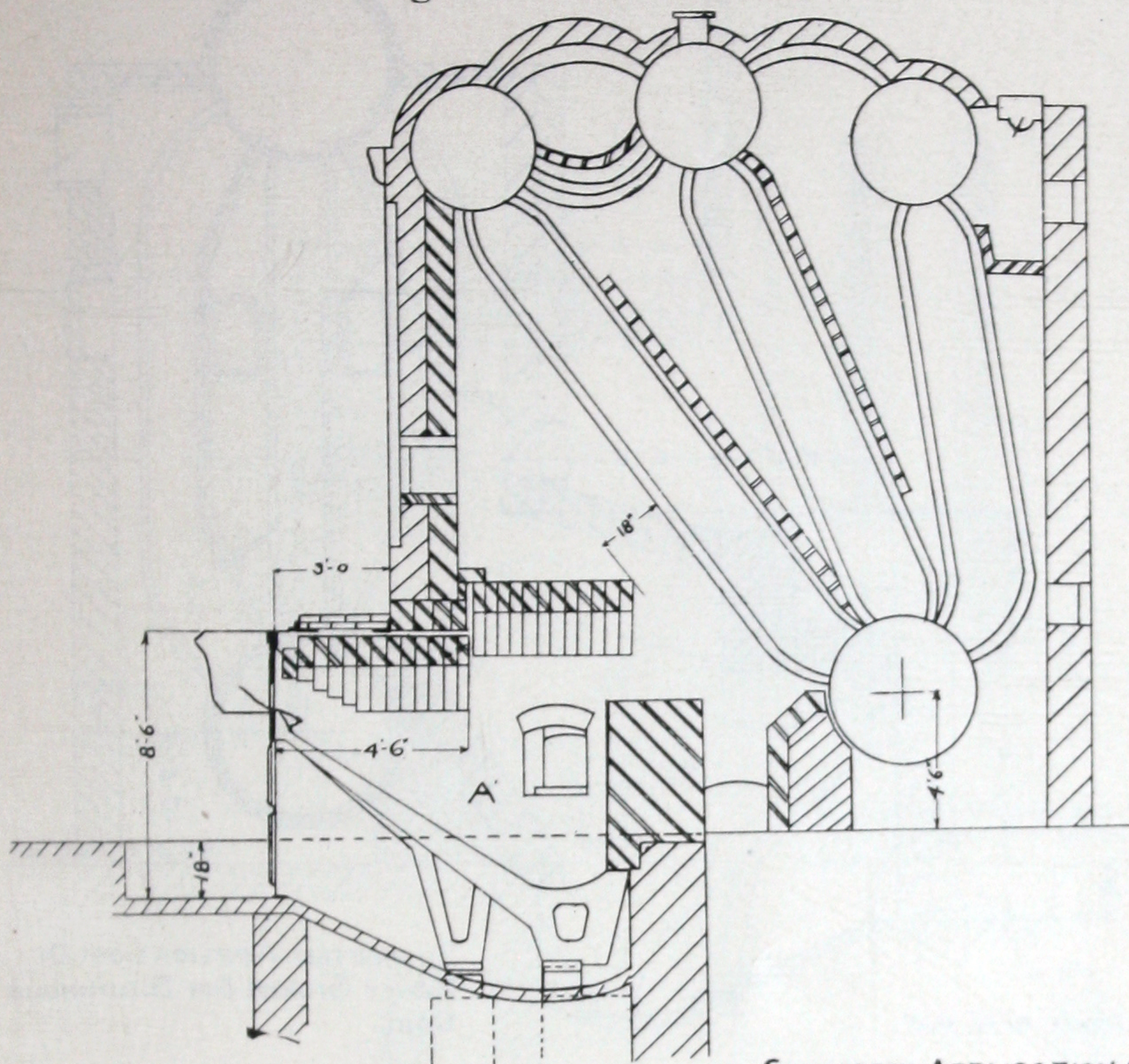
The result depends upon the thoroughness with which the lining is pounded in and the thickness of your lining.

PLIBRICO cannot be used as a plaster in facing a fire brick setting but must in all cases be used in replacing the fire brick bodily.

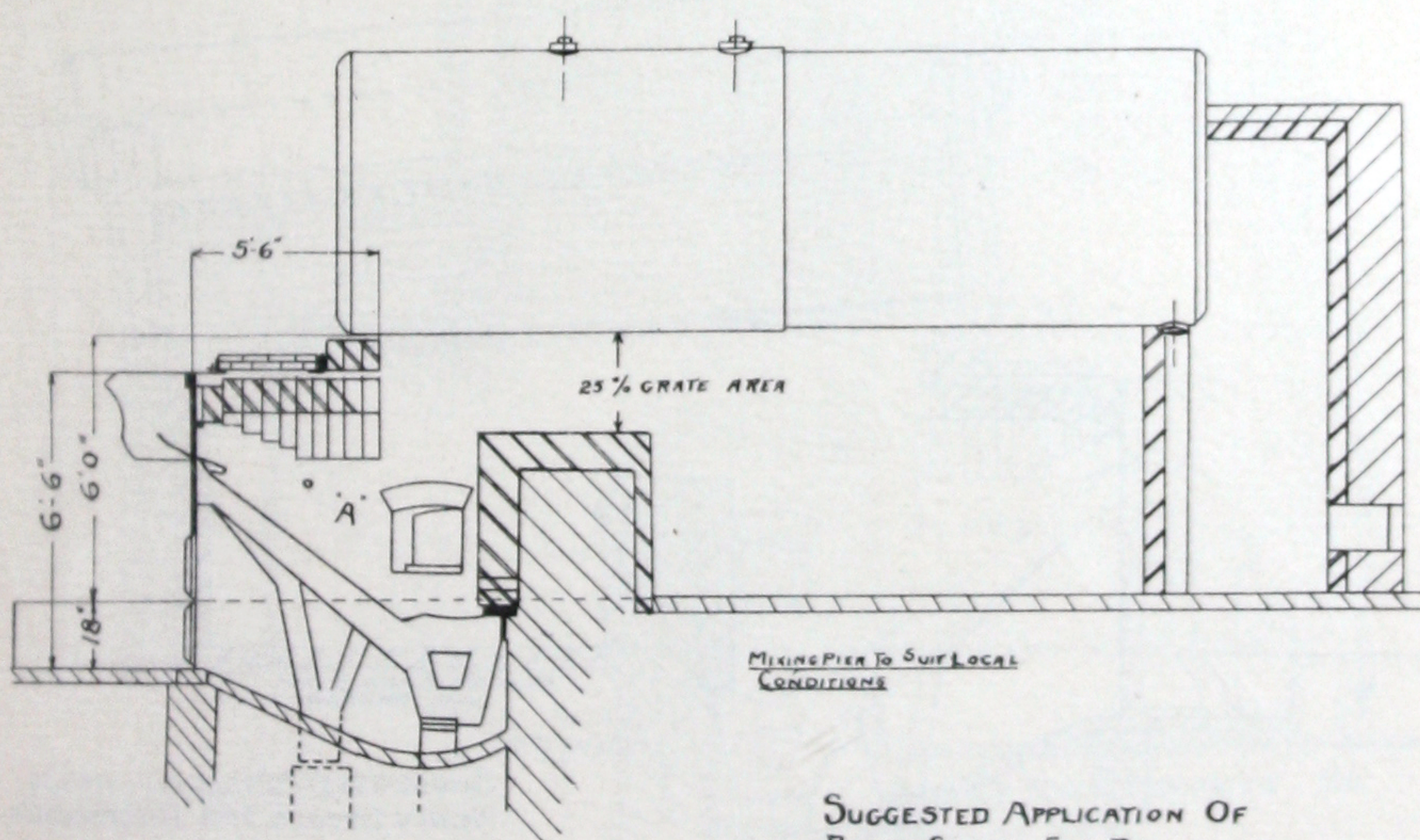
When side walls are complete they may be faced and smoothed with a trowel.

DEVIL'S PUTTY

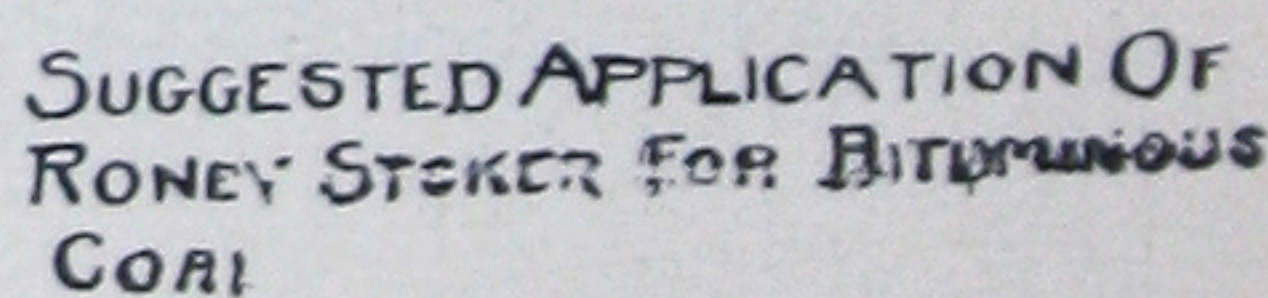
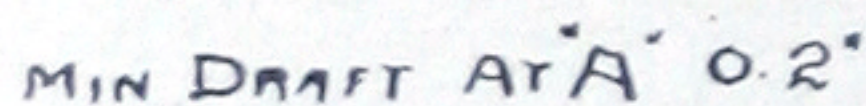
Single Inclined Stokers



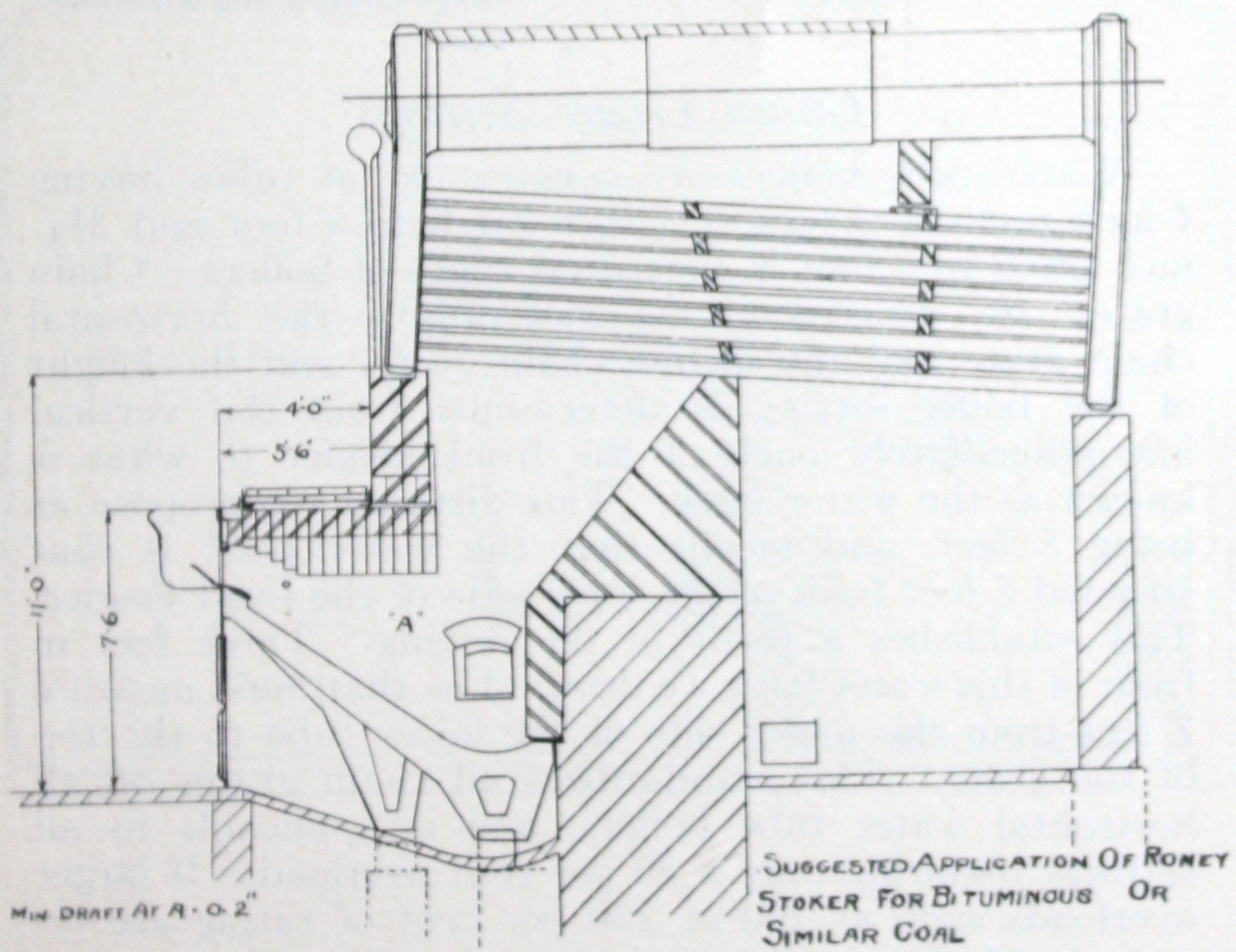
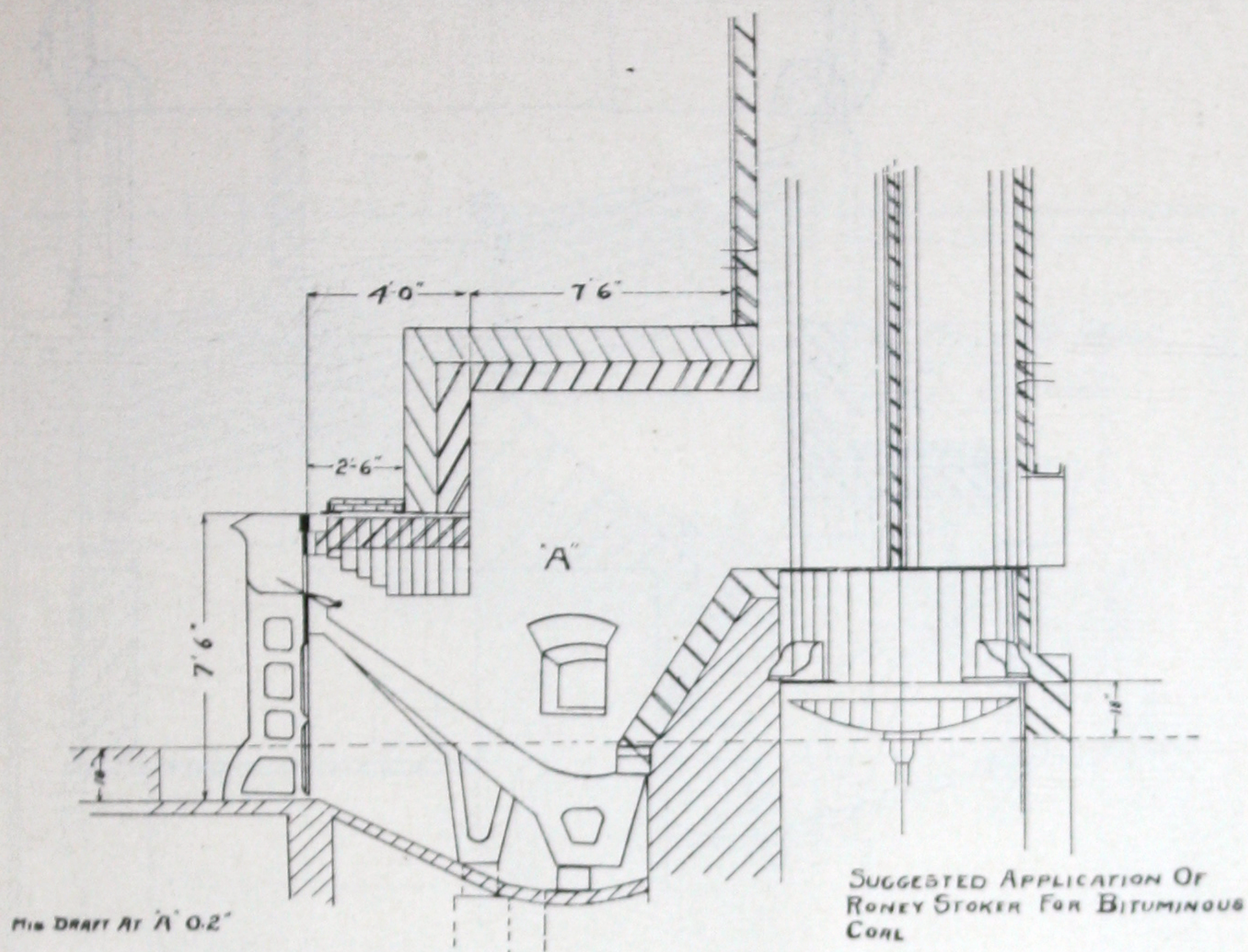
SUGGESTED APPLICATION OF
RONEY STOKER FOR BITUMINOUS
COAL

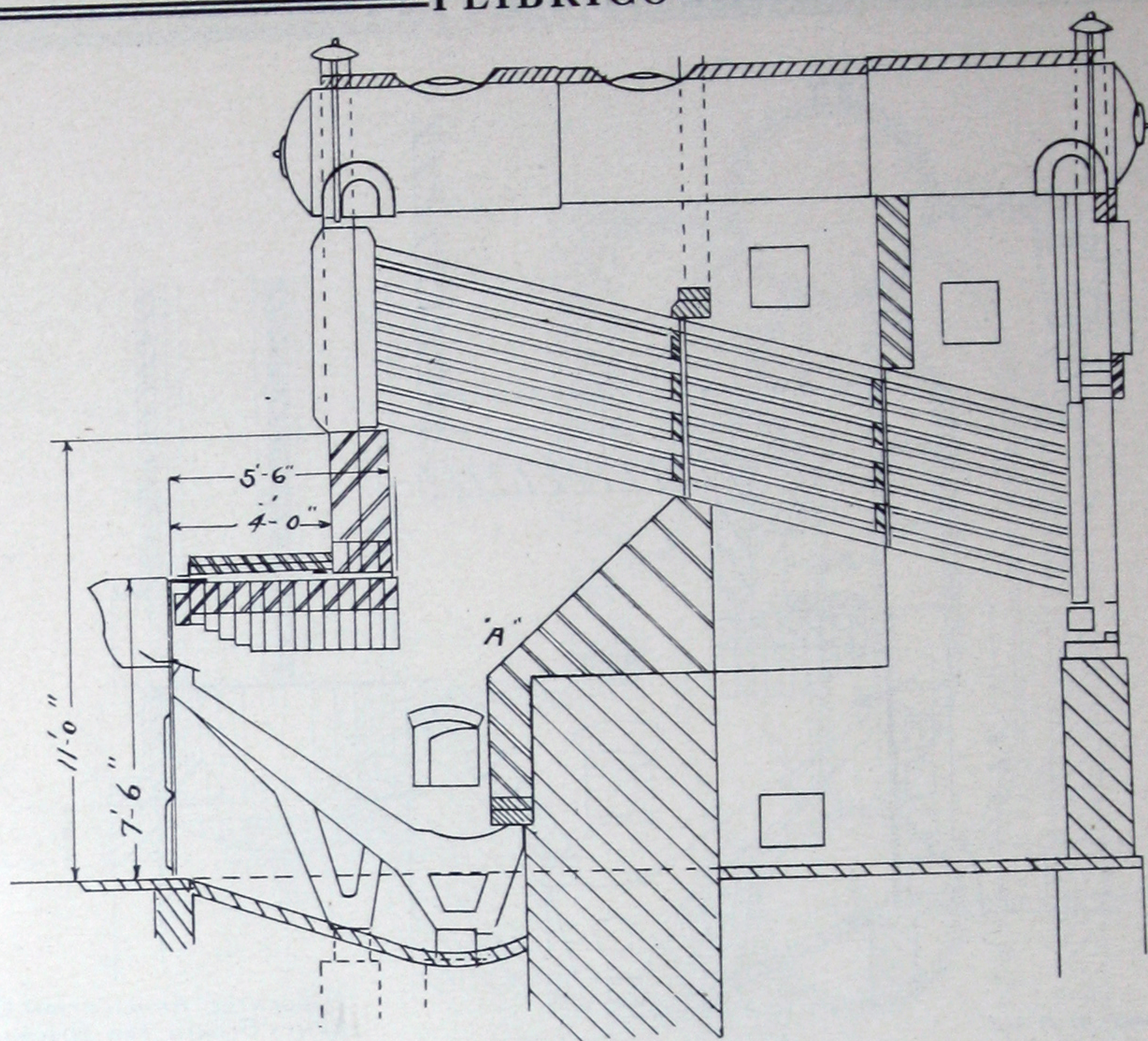


SUGGESTED APPLICATION OF
RONEY STOKER FOR BITUMINOUS
COAL



DEVIL'S PUTTY





MIN DRAFT AT A ".2"

SUGGESTED APPLICATION OF
RONEY STOKER FOR BITUMINOUS
COAL

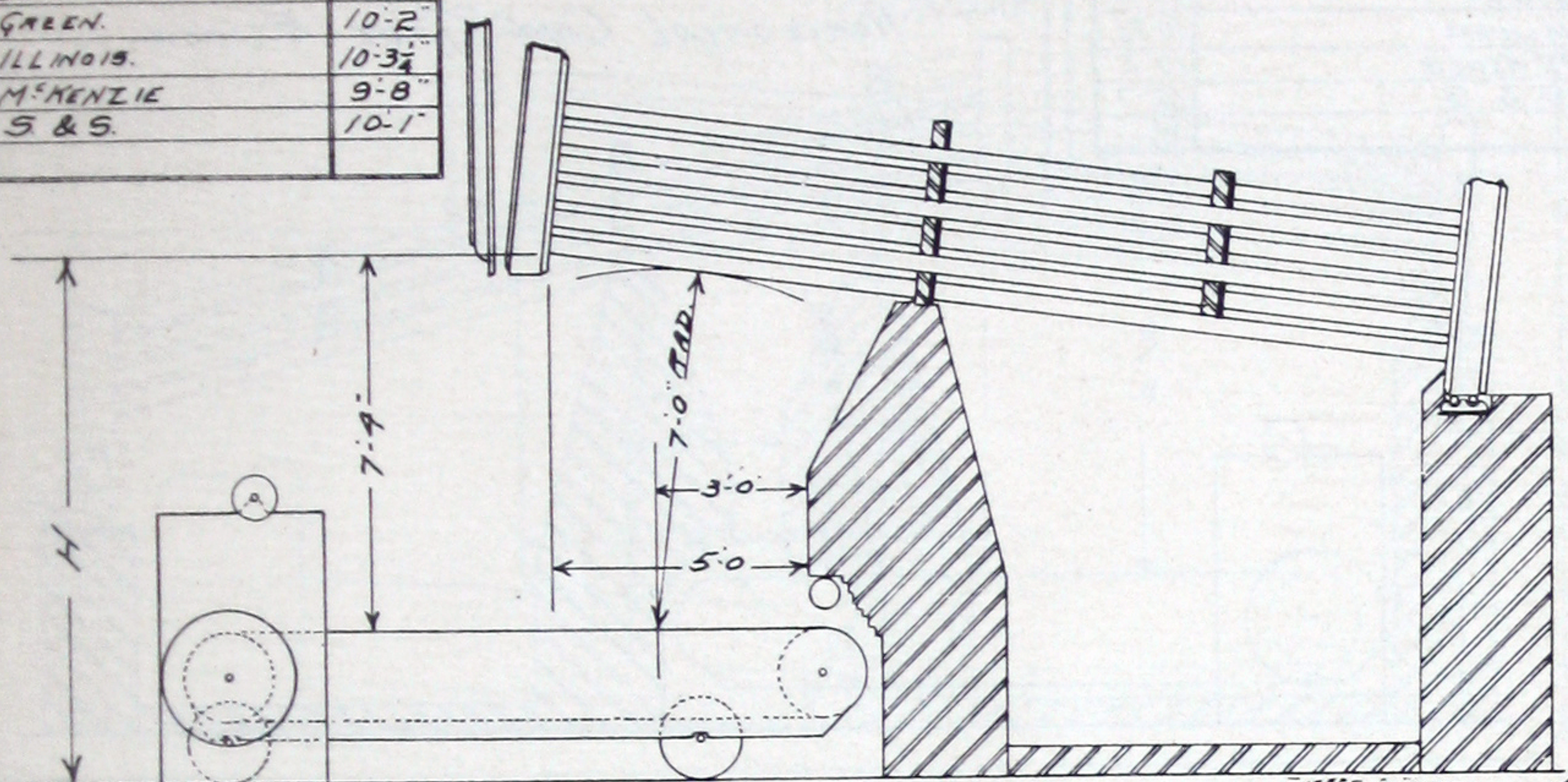
Chain Grate Settings

Water tube boilers are constructed in tubes having 1-inch pitch to a foot, $1\frac{1}{2}$ -inch pitch to a foot and $3\frac{1}{4}$ -inch pitch to a foot in horizontal types of boilers. Chain grates are constructed of two kinds—the horizontal chain grate and the incline chain grate, and the height of the boiler setting is determined from the vertical line immediately back of the front header to what is known as the water back. This distance we propose as being 5 feet, and means that the water back is constructed 5 feet back of the inner side of the front header. This establishes a point in the setting. Three feet in front of this water back we draw a line that must measure 7 feet from the under side of the lower tube to the top of the grate. This standardizes all chain grates on all horizontal water tube boilers, and is applicable to all settings requiring only a 50 per cent overload. If larger overloads such as 200 or 250 per cent of rating are required, this line is extended about 3 feet.

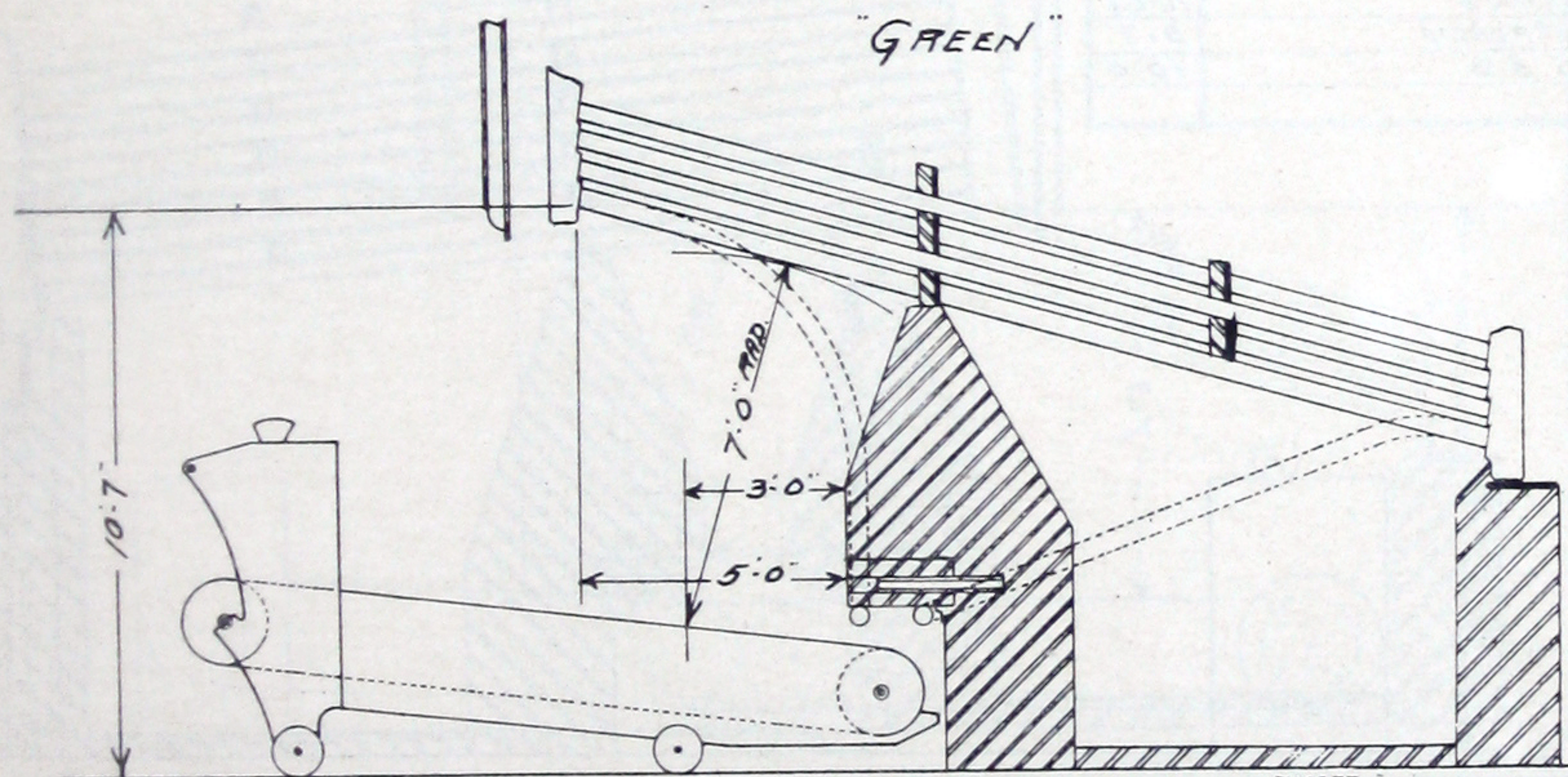
DEVIL'S PUTTY

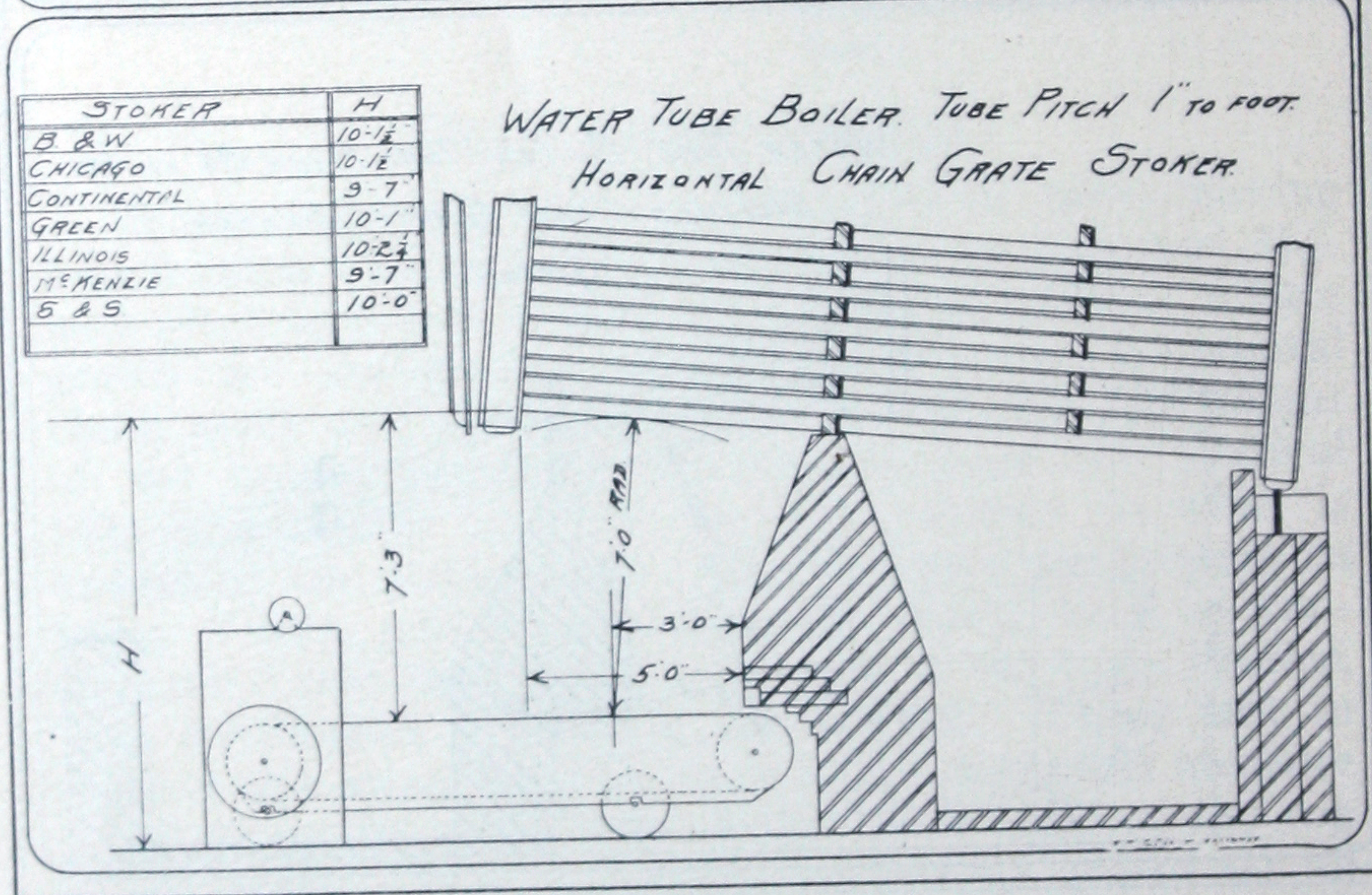
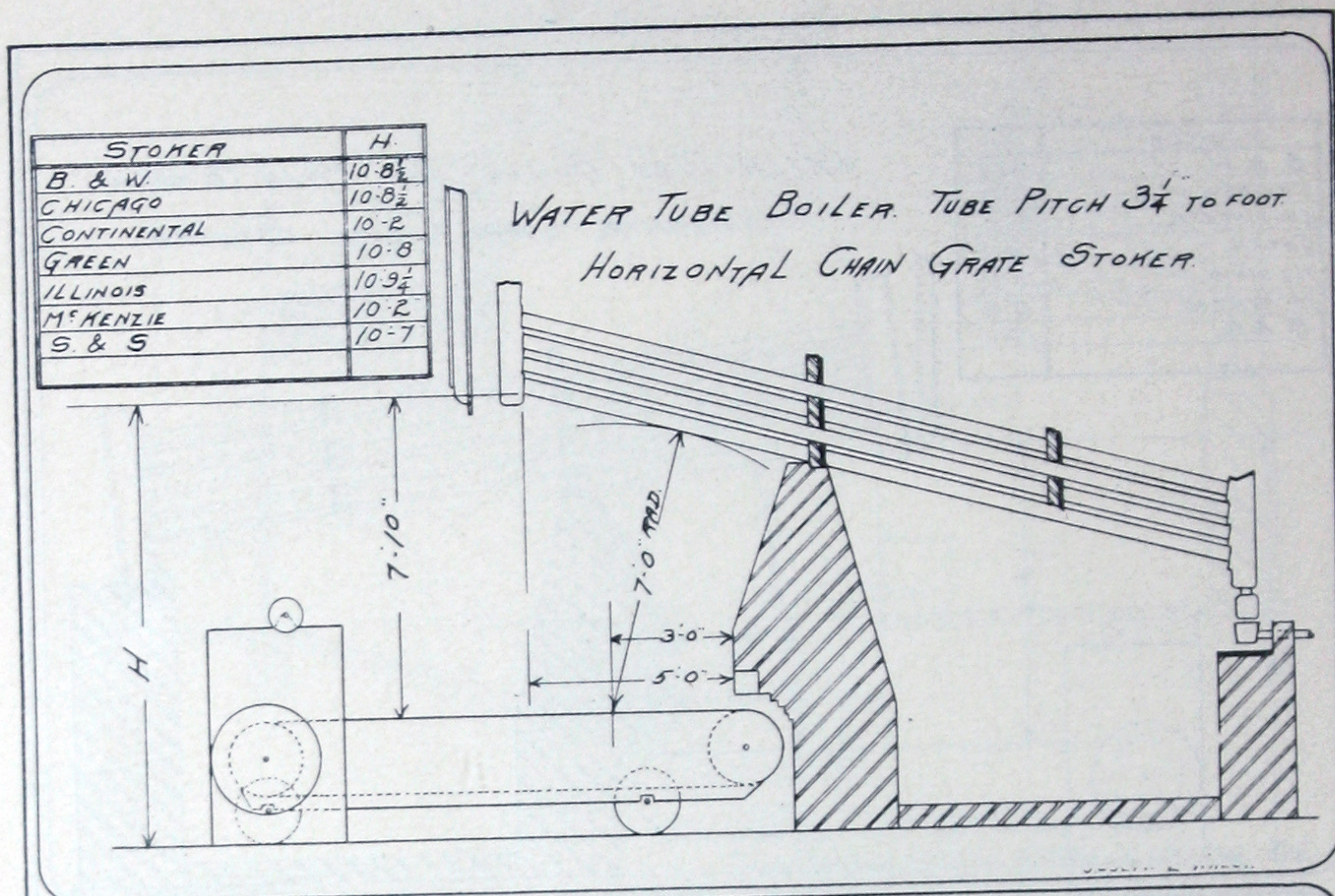
STOKER	H
B. & W.	10-2 1/2
CHICAGO	10-2 1/2
CONTINENTAL	9-8
GREEN	10-2
ILLINOIS	10-3 1/4
MCKENZIE	9-8
S & S	10-1

WATER TUBE BOILER. TUBE PITCH $\frac{1}{2}$ " TO FOOT.
HORIZONTAL CHAIN GRATE STOKER.



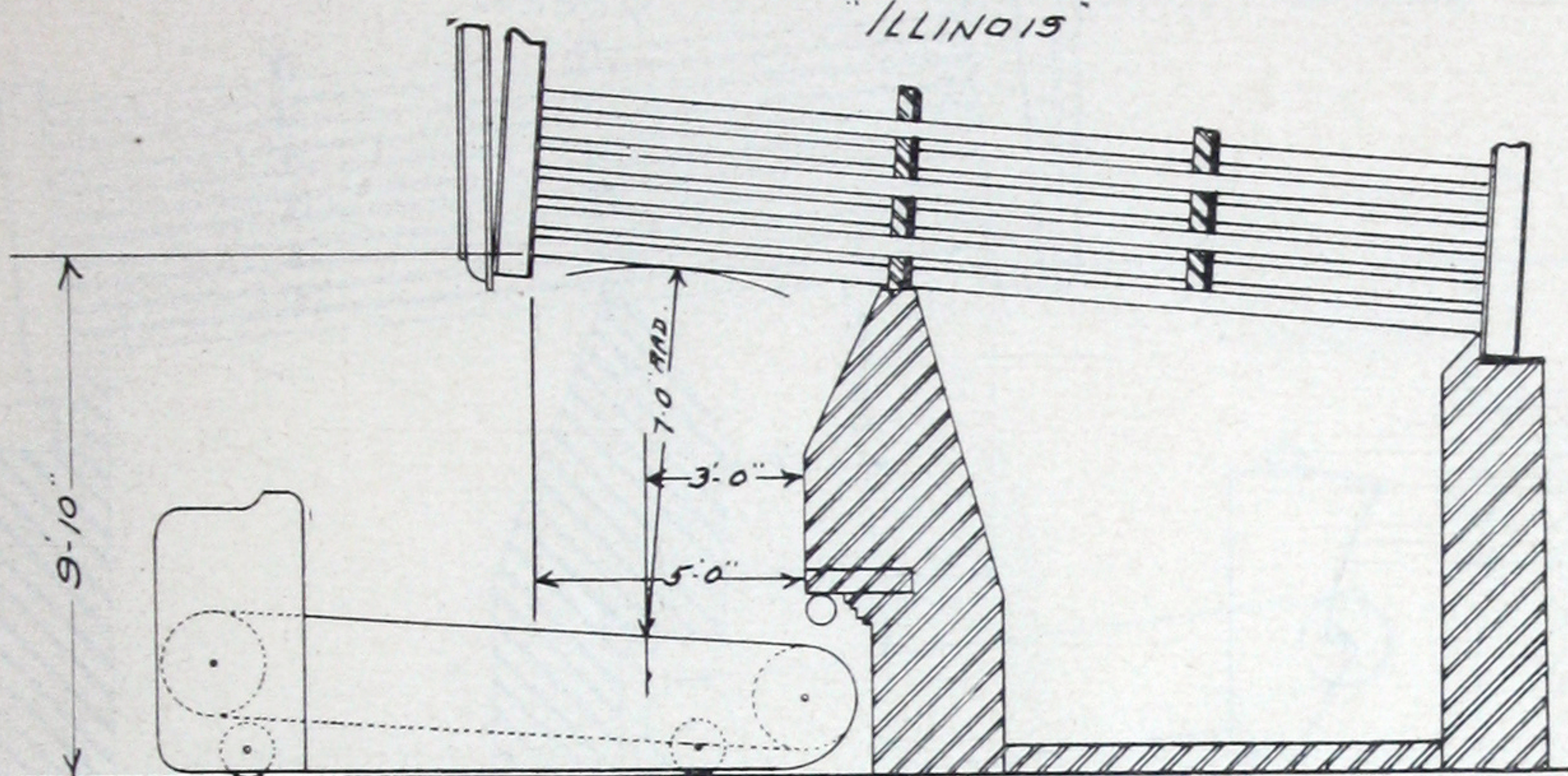
WATER TUBE BOILER. TUBE PITCH $3\frac{1}{4}$ " TO FOOT.
INCLINED CHAIN GRATE STOKER
"GREEN"



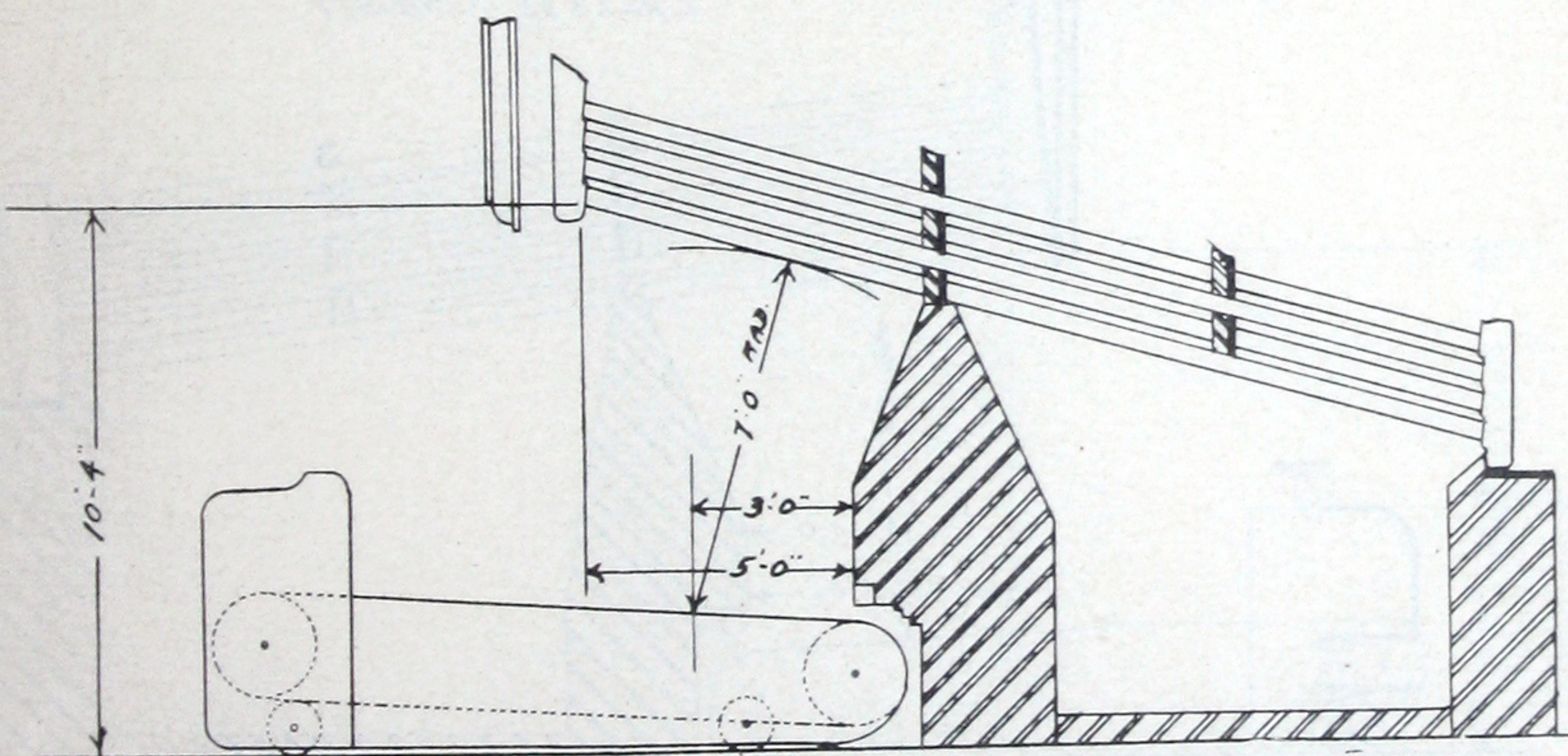


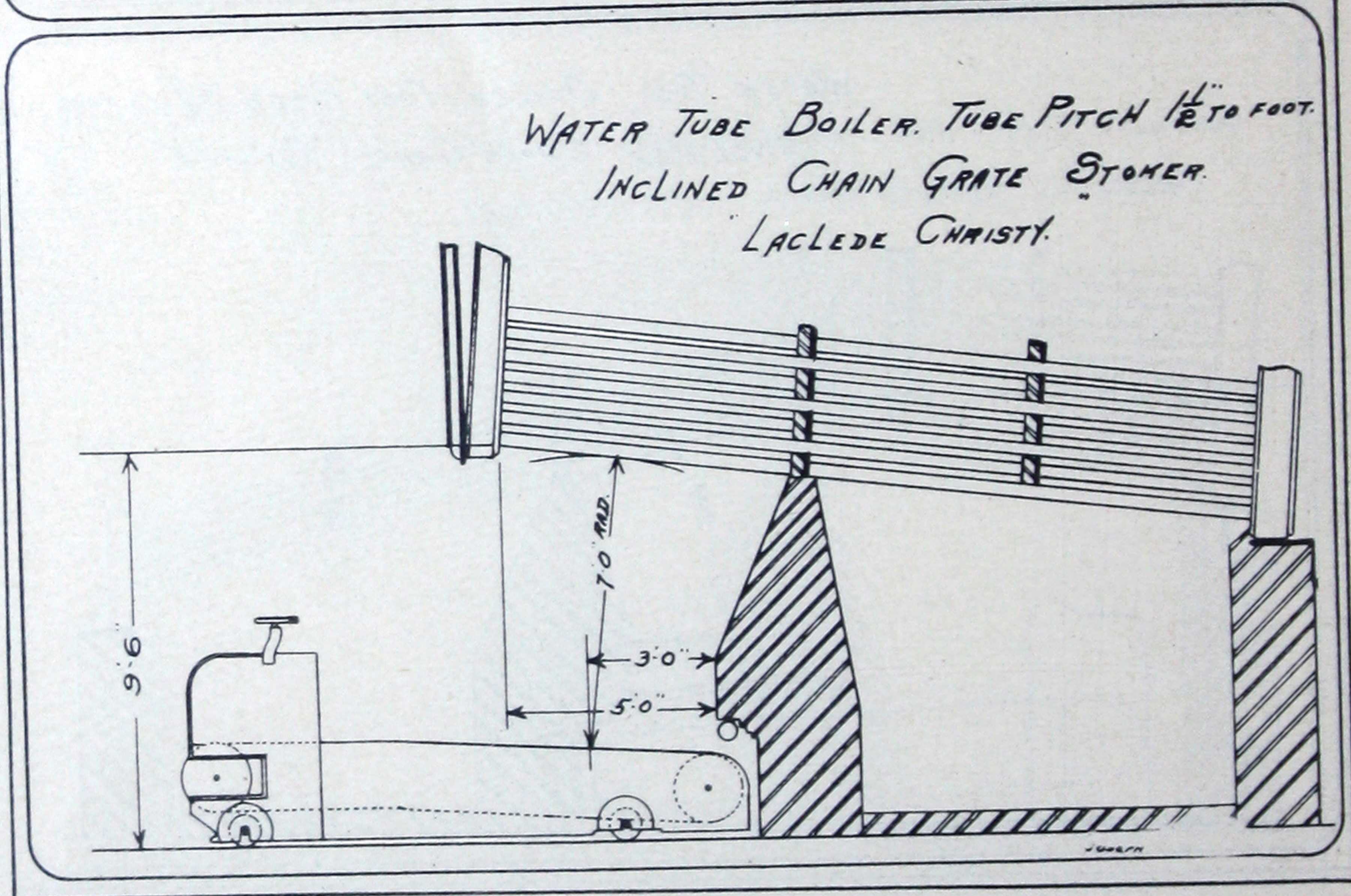
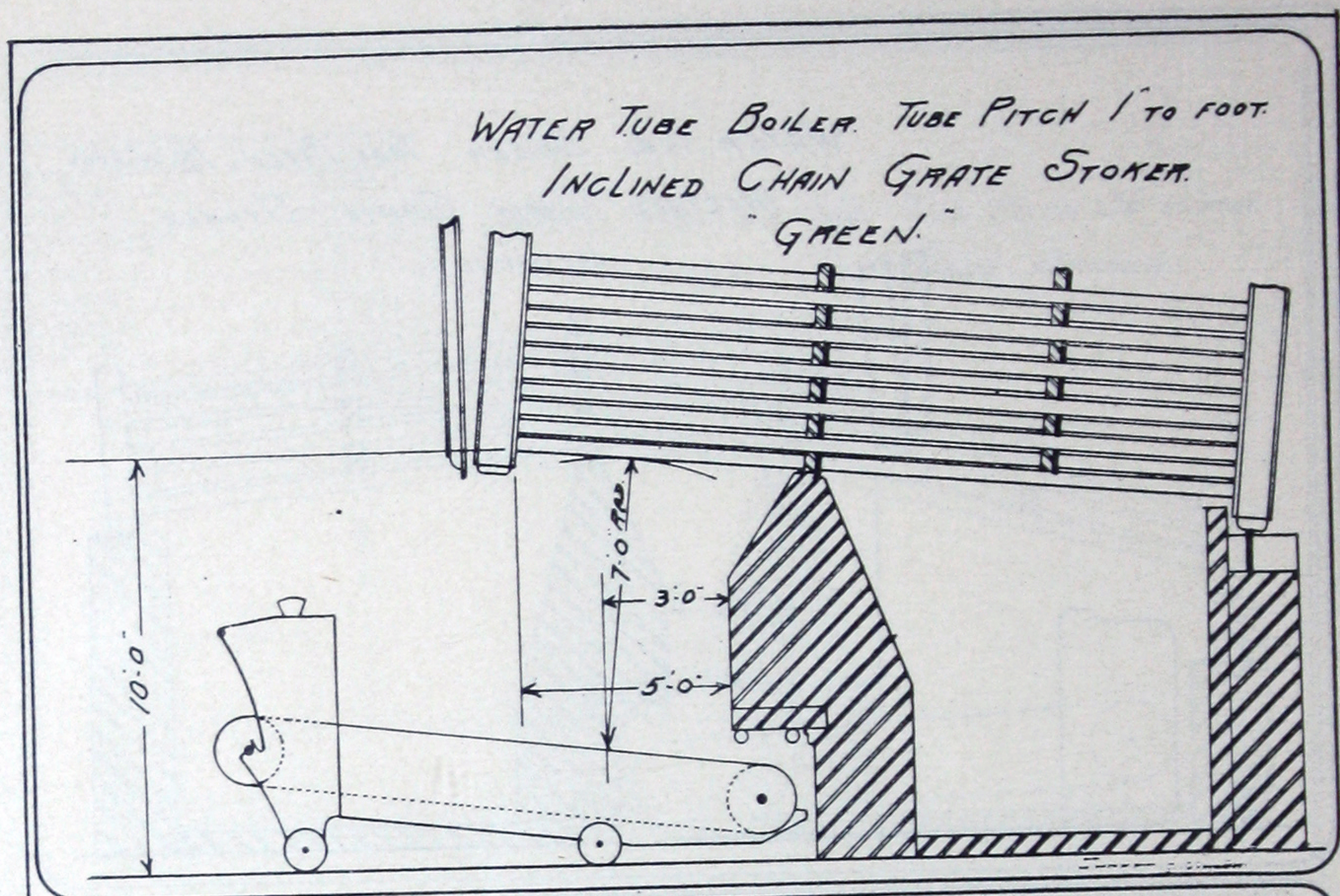
DEVIL'S PUTTY

WATER TUBE BOILER. TUBE PITCH $\frac{1}{2}$ " TO FOOT.
INCLINED CHAIN GRATE STOKER.
"ILLINOIS"

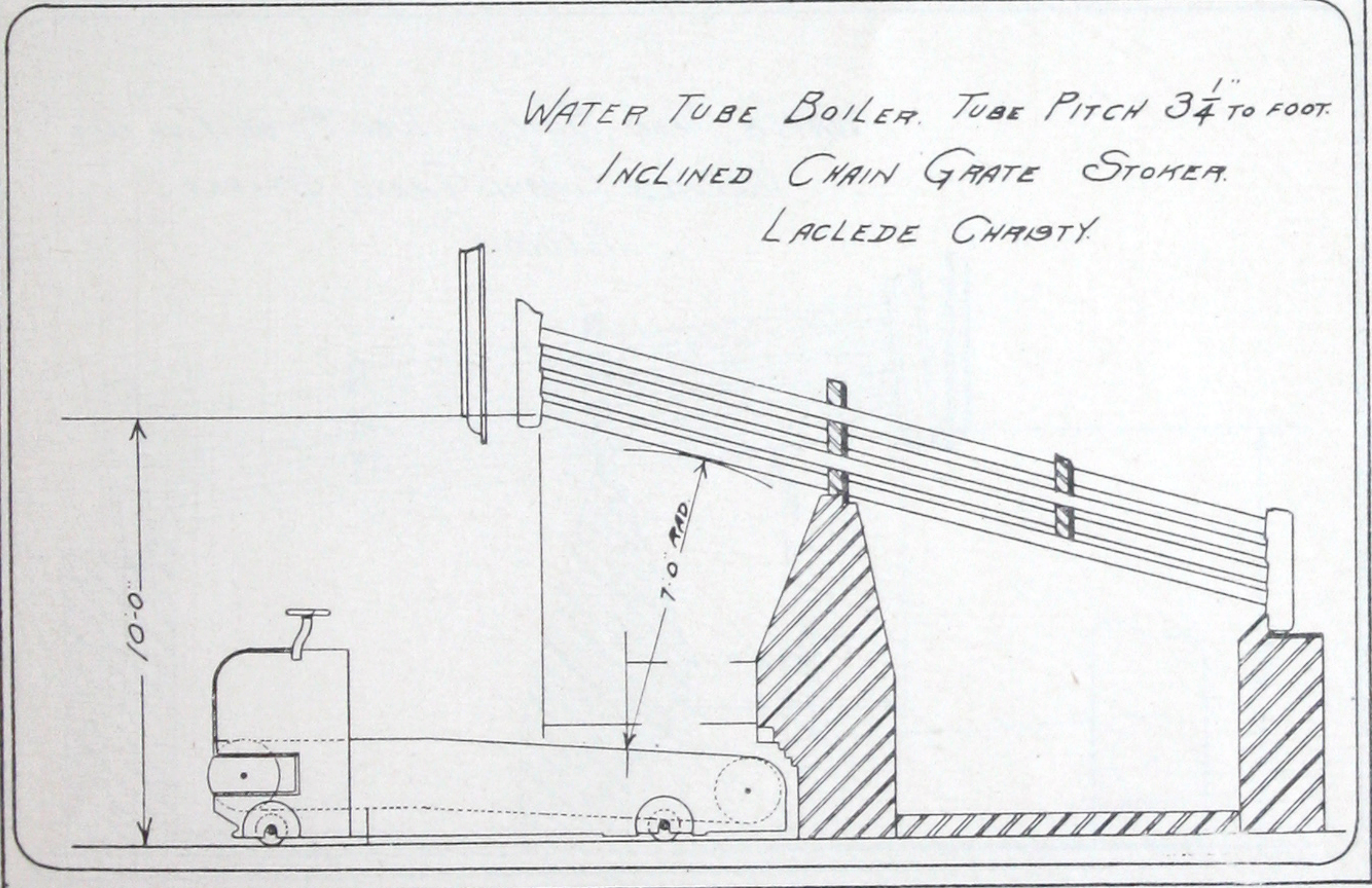
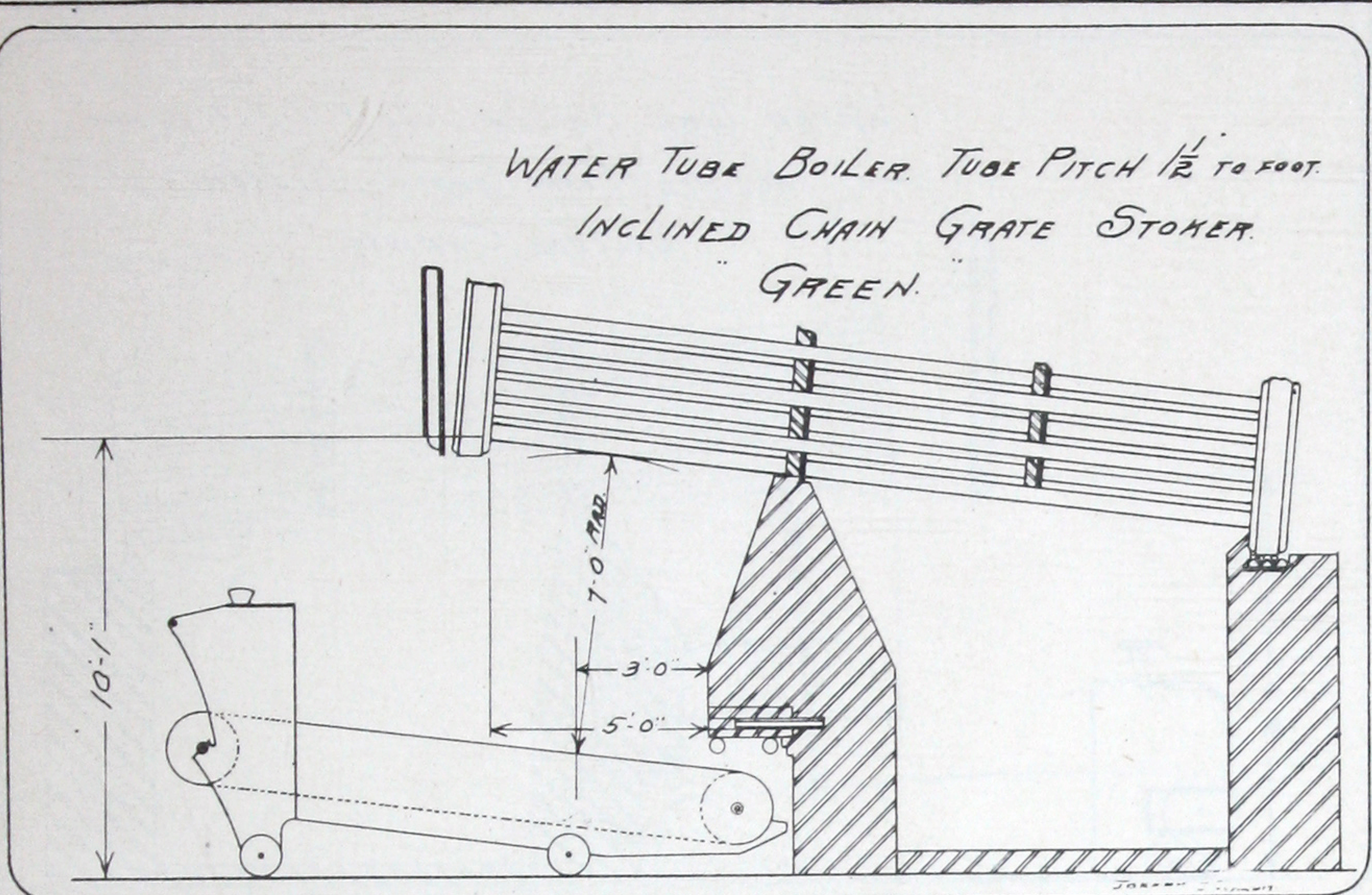


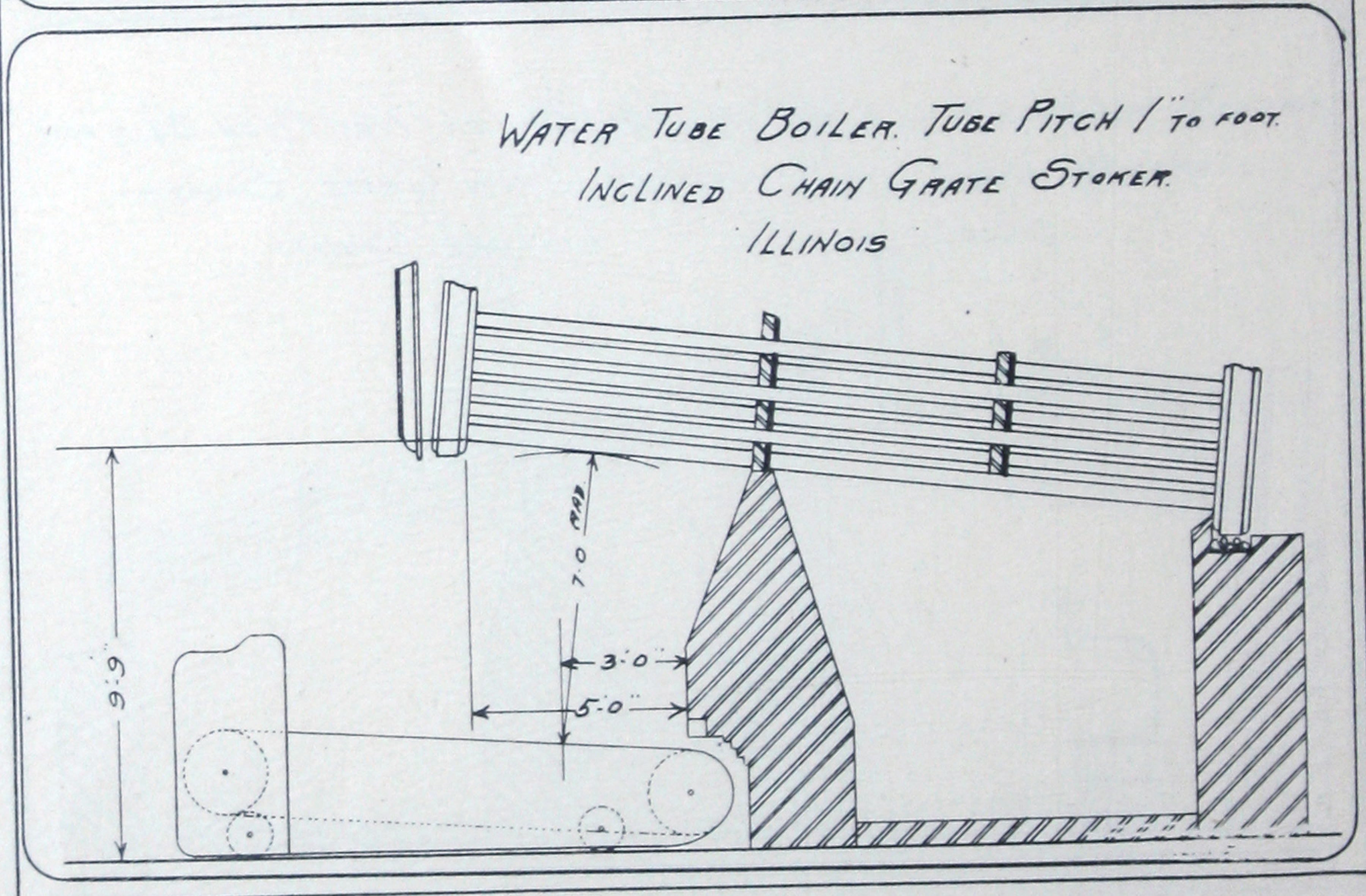
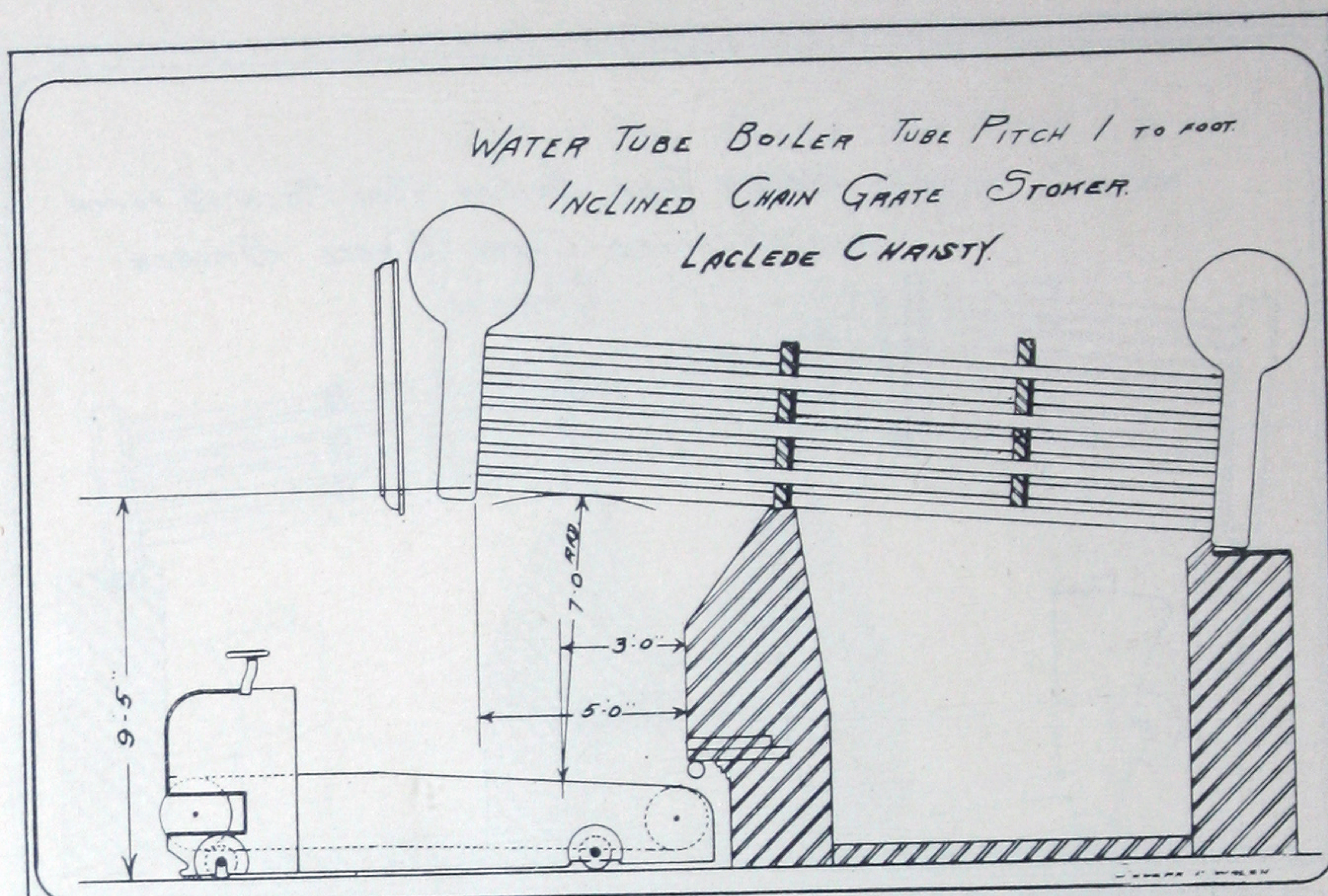
WATER TUBE BOILER. TUBE PITCH $3\frac{1}{4}$ " TO FOOT.
INCLINED CHAIN GRATE STOKER.
"ILLINOIS"

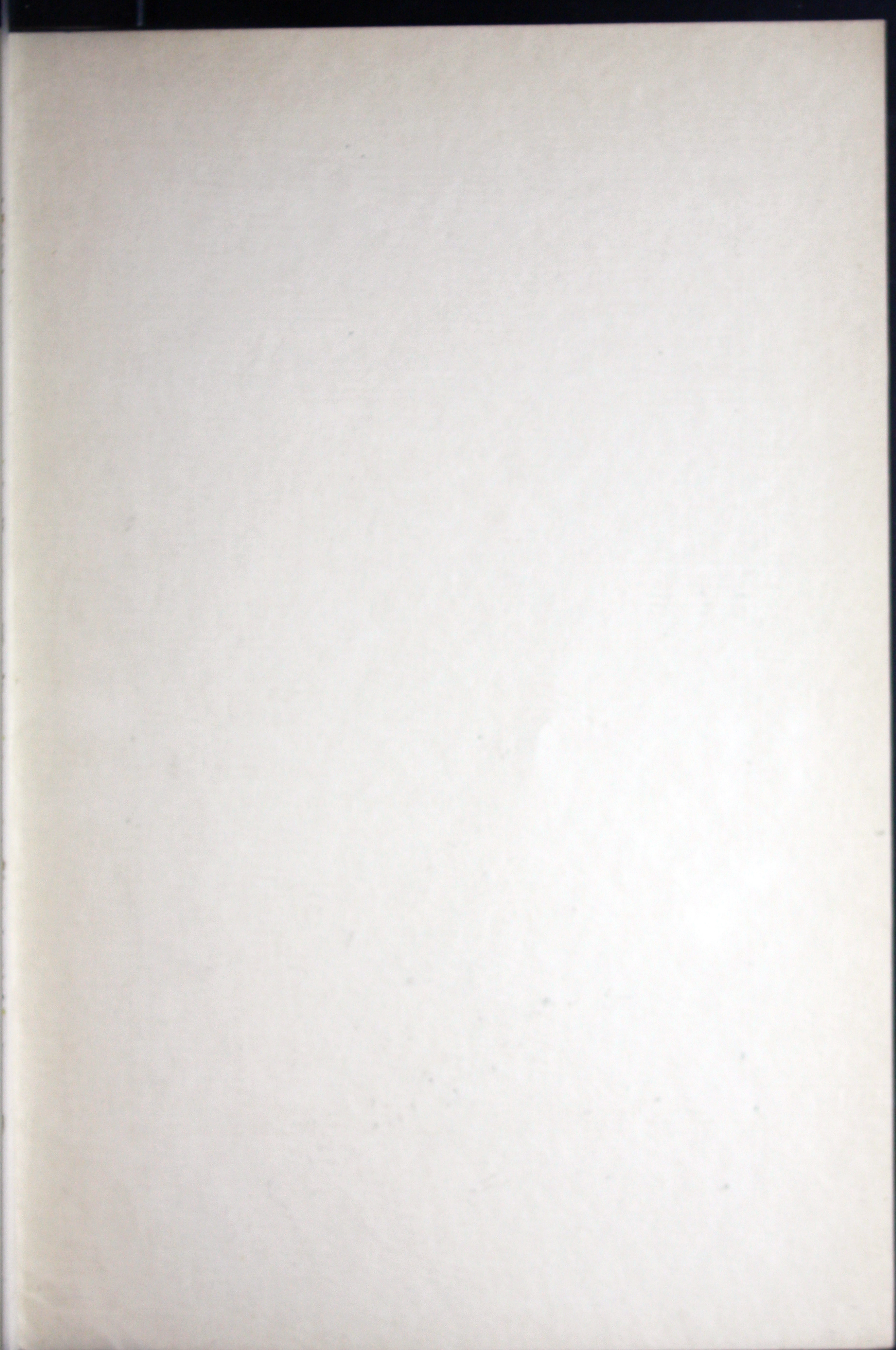




DEVL'S PUTTY







PLIBRICO Is Carried In Stock For Immediate Delivery at

Atlanta, Ga.	A. W. Jones
Boston, Mass.,	. , .	G. P. Anderson & Co.
Cleveland, Ohio	. . .	Andrews-Bradshaw Co.
Cincinnati, Ohio	. . .	Doermann-Roehrer Co.
Detroit, Mich.	. . .	James E. Walsh
Duluth, Minn.	. . .	J. F. Nauffts
Grand Rapids, Mich.	. . .	K. Dykema
Houston, Texas	. . .	Chas. Gruneberg & Co.
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